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NEW ZEALAND JOURNAL OF AGRICULTURE

OCTOBER 1961

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Cover

Equipment being demonstrated at the bulk grain conference (see August "Journal") at the Canterbury A. and P. Association's showgrounds at Addington. In the right background is the recently completed Canterbury Court, which provides 26,000 sq. ft. of unobstructed floor space. The Canterbury A. and P. Association will hold its Centennial Show in 1962.

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Comprehensive Trials Show

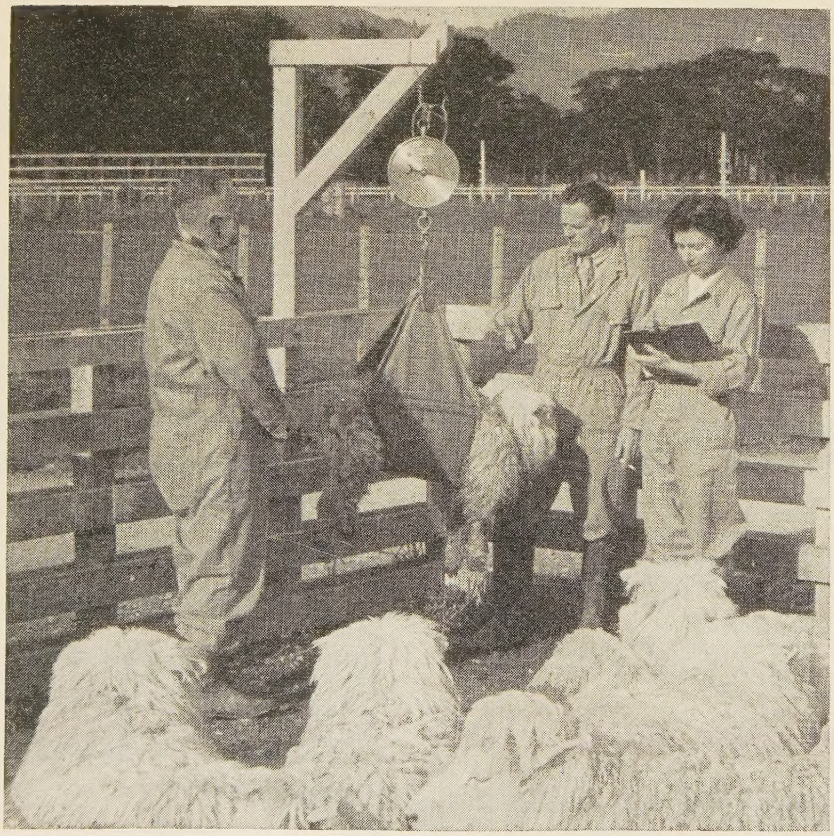
Liveweight Responses to Selenium in Lambs

but Few Responses to Cobalt

SOME 700 lamb dosing trials involving about 40,000 animals have been conducted by officers of the Department of Agriculture in the past three years in what has been one of the largest and most comprehensive series of animal experiments ever attempted in this country. The trials have shown:

- Liveweight responses to selenium occur in lambs over very extensive areas of the South Island and considerable areas of the North Island.
- Growth responses to cobalt were few and no new areas showing a marked deficiency were discovered.
- An unexpected feature was a slight depression in liveweight gain to cobalt bullets on most soil groups examined.

By
T. G. ROBERTSON,
Scientific Officer,
and
C. DURING,
Senior Scientific Officer,
both of the Department
of Agriculture, Wellington

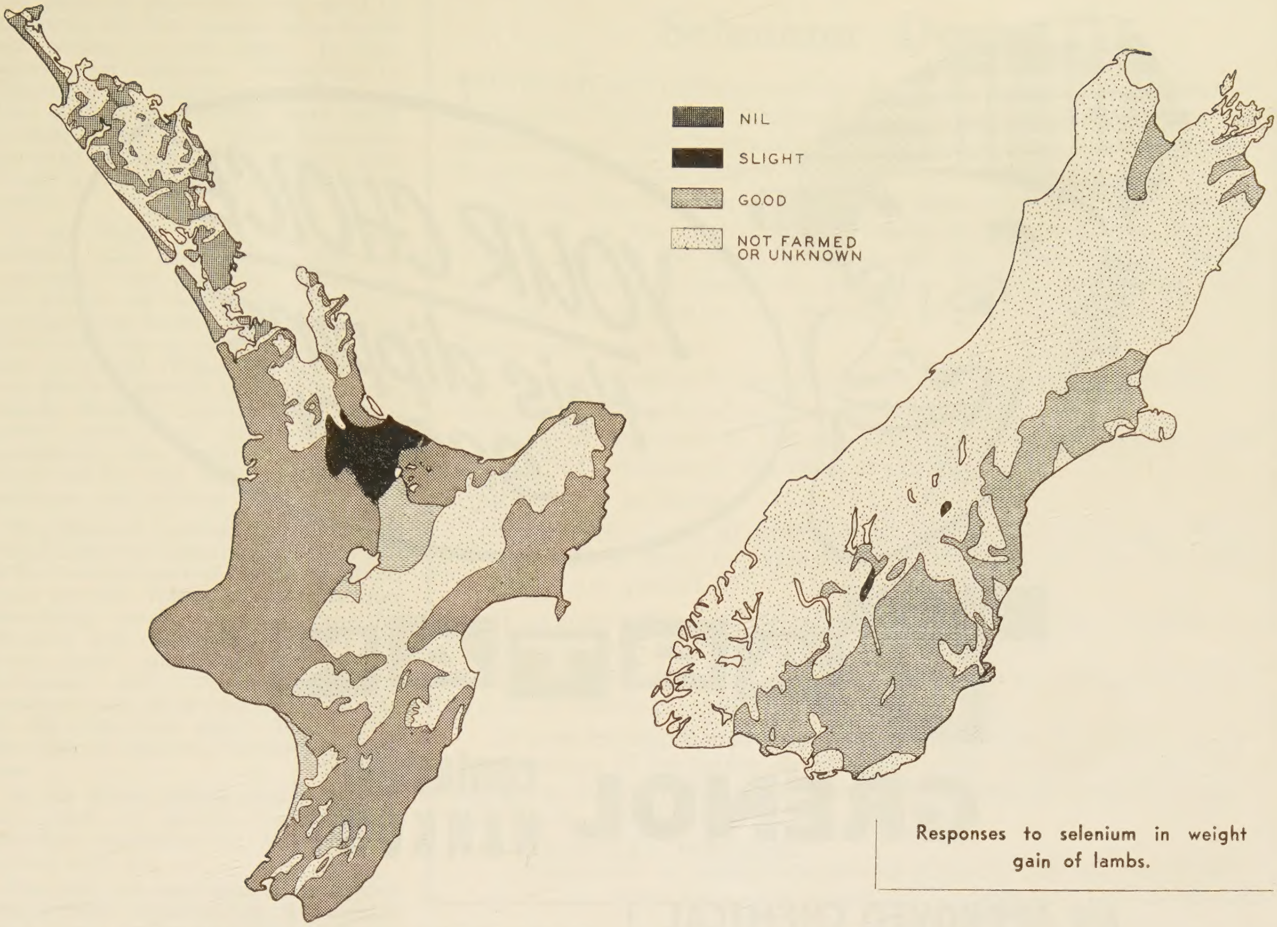


THE importance of the element cobalt in ruminant nutrition was first realised in New Zealand in 1935. It was shown that a deficiency of this element was responsible for bush sickness, a disease which had made farming on the central North Island pumice country difficult and in some areas impossible. Other areas of the country were also found to be deficient, in particular areas in the Nelson-West Coast district and parts of Southland.

Selenium was first used in New Zealand three years ago to prevent white muscle disease in lambs. It was later discovered that this element also corrected a barren ewe problem which was sometimes associated with outbreaks of white muscle disease. A more important discovery, however, was that selenium would prevent or cure some forms of unthriftiness and mortality in lambs which occurred not only in areas prone to white muscle disease but also where this condition does not occur.

Object of Survey

While selenium had been found to give good weight responses in localised areas in both the North and South Islands, the extent to which this unthriftiness occurred in the country in general was not known. Cobalt-deficient areas, known and suspected, had been tentatively mapped, but it was thought that more information should be obtained on the extent to



Responses to selenium in weight gain of lambs.

which cobalt responses might occur, particularly on those soils where the disease was at best only suspected. Consequently a large-scale survey of the effect of these elements on lamb thrift was begun by the Department of Agriculture in the autumn of 1959.

The survey was not planned to look for optimum rates, but was concerned more with finding the areas where the treatments were beneficial. Detailed trials on rates and times of administration of selenium were being carried out by officers of the Wallaceville Animal Research Station concurrently with this survey. As a result of these investigations, conducted on the severely deficient areas of coastal sands round Flock House, near Bulls, and on the Taupo pumice, general suggestions for dosing sheep for the prevention of selenium responsive diseases are given in the panel on page 309.

For this first season the survey was restricted to portions of the South Island where altogether just under 100 trials were carried out. Most of these trials compared lambs to which a cobalt bullet had been given with a similar but untreated group. A number of the trials included a selenium comparison and a few a copper comparison also.

Every one of the 14 trials which included selenium showed at least a slight response from it and differences of up to 7.3 lb in weight gain over three months were observed. In about half the trials the cobalt-dosed animals gained more than the untreated ones, but in the other half they gained rather less. Overall the effect of cobalt appeared negligible, the number of apparent responses and depressions to cobalt being much as would be expected to occur by chance in a large series like this.

Trials Expanded

However, encouraged by the results from selenium, and the knowledge that cobalt deficiencies may show up some years and not in others, the series was expanded in both size and scope in the following season (1959-60).

The standard trial in this year consisted of four groups of 15 to 20 animals. Group 1 was left untreated; group 2 received a cobalt bullet monthly; group 3 was treated monthly with selenium (5 mg by mouth); group 4 received both cobalt and selenium. Many of the trials included other factors, such as copper. Some compared cobalt given as a drench with cobalt given as a bullet.

Altogether some 300 trials were carried out in 1959-60 and in the following season a similar number was done with the same basic pattern of treatments, but with some slight modifications. A cobalt bullet thought to be an improvement on the one given earlier was used, but only one of these was given to each animal instead of one each month as previously. As before selenium was given monthly, but the dose was reduced from 5 mg to 1 mg.

Results over the three seasons have been similar. Deaths were few and did not appear to be related to the treatments. This indicates that if ill thrift occurred at all in the trials, it was not generally serious.

Results have been examined in relation to soil class, previous history, quantity and quality of feed available, and several other factors. The results for selenium, cobalt, and other comparisons are dealt with in detail individually below.

Selenium Responses

Responses to selenium occurred throughout the country. There was no evidence that any part of New Zealand suffers from an excess of this element such as occurs in some areas in other

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countries. Responses varied in degree from place to place and from good to negligible, but they appear to be fairly well related to soil type. In this survey good responses correspond to differences in weight gain of up to 10 lb over three months, with most between 2 and 5 lb. Slight responses represent differences in weight gain of only a pound or two over the same period.

In the South Island east of the Southern Alps responses to selenium drenching were the rule. Soils and soil groups on which the effect of selenium was doubtful were those on which very few or no experiments had been conducted. These less well examined districts include the Marlborough Sounds, Banks Peninsula, some of the fertile downs and hills of North Canterbury, the foothills and mountains, and the few soils derived from limestone and volcanic material.

The general position in the South Island is shown in the map on page 307. In the western part of the South Island good growth responses to selenium drenching were obtained on the Moutere soil of Nelson, but on the West Coast including the Buller, Karamea, and Westland districts selenium may be of very slight benefit on the river flats only. The Golden Bay district requires further examination.

In the North Island most trials did not show a growth response to selenium administration, but those on certain soils did.

The best and most consistent positive effects were obtained on the coastal sands from Paekakariki to Wanganui, on the light stony soils of Wairarapa, Horowhenua, and Hawke's Bay, and on the coarser pumice soils in the Taupo-Rotorua area. There is evidence, however, that responses are not obtained on all the coastal sands or on all the pumice soils. For instance, many trials on the vast areas of pumice along the east coast from Napier to Whakatane have shown no benefit from selenium. It also seems that on the pumice soils once under forest in the King Country and South Waikato sheep do not respond to selenium drenching. Thus on most pumice soils selenium may not have a place.

The approximate extent of selenium responsive areas in the North Island is shown in the map on page 307. It is not possible, however, to show the precise extent of land on which good responses to selenium were obtained in the Taupo-Rotorua area.

There is no evidence of selenium responses on the coastal sands of Taranaki or further north along the west coast, but on the small areas of coastal sands near Tauranga and on the Coromandel Peninsula good selenium responses were obtained.

On the millions of acres of hill country along the east coast of the North Island, from Wellington to Cape Runaway, and also in North Auckland and from Wanganui to the Waikato River mouth selenium deficiency, if present, appears to be rare.

Selenium Dosing

INVESTIGATIONS carried out by Wallaceville Animal Research Station have been designed to ascertain the dose rates of selenium, and their frequency of administration, that are necessary to prevent selenium responsive unthriftiness in lambs.

During the last two seasons there have been detailed trials on properties on the central North Island pumice soils and on the coastal sands on the south-west coast of the North Island. Based on these investigations the following general suggestions for selenium administration can be made:

Barren ewe problem:

5 mg of selenium by mouth one month before mating begins.

Congenital and delayed white muscle disease:

5 mg of selenium to the ewe one month before lambing and 1 mg of selenium to the lamb at docking

Unthriftiness in lambs:

Prevention: 1 mg of selenium to the lamb at docking. 5 mg repeated at two- to three-monthly intervals or each time the lambs are yarded.

Treatment: 5 mg of selenium as an initial dose followed by 5 mg at two- to three-monthly intervals.

A satisfactory growth rate can be obtained by giving the lambs a dose of selenium each time they are yarded.

It must be emphasised, however, that selenium is not the answer to all forms of unthriftiness in lambs. For example, it does not appear to have any beneficial effect on the "autumn flush ill thrift" common in the North Island.

—*W. J. HARTLEY, Pathologist,*
Department of Agriculture Animal Research Station, Wallaceville

Areas of the North Island in which more experimental work is needed are mid Hawke's Bay and the Waikato-South Auckland districts. For instance, further investigation may show that selenium will be of value on the peat and peaty soils of the Waikato.

Other Factors Affecting Selenium Responses

Soil type, then, accounts very largely for the differences in degree to which selenium responses occur, but other factors may also affect it. For instance, the trials tended to show better response to selenium when the untreated animals were doing well than when they were doing poorly. With the average weight gain in the untreated group of, say, 20 to 30 lb over three months, the extra gain from selenium treatment may be 3 or 4 lb, but where the untreated group is almost stationary selenium may not produce an improvement. Indeed, in some cases the selenium dosing has produced a poorer gain, though generally there was still a slight observed selenium response. The mechanism causing this is not understood, but it works in the opposite way to what might be expected if selenium is a limiting factor to growth.

The trials were examined for association of responses with other factors, such an animal food supply, soil moisture, and previous cropping or topdressing, but no relationships were evident. Partly this may be because several of the factors were almost constant over all the trials. Consequently their effect could not be evaluated. For instance, very few of the trials were on areas which had been cropped in the last two or three years and soil moisture as assessed by observation did not vary greatly over the trials.

The possibility of the size of the response being related to the age of the animal when first treated was also examined. There was no noticeable association of time of treatment with the size of response over three months, but naturally animals treated earlier have the advantage of selenium for a longer period. The important thing is that treating even quite young animals did not cause any damage, so that selenium can be given quite soon after birth.

In the few trials where the comparison could be made, ewes treated with selenium tended to produce bigger

LAMB DOSING . . .

lambs than those which had not been treated, but even these lambs benefited from later treatment.

Results with Cobalt

An unexpected feature of these results was a slight depression in liveweight gain to cobalt bullets on most soil groups examined. It has been suggested that this widespread depressive effect may be due to the presence of the bullet itself and that the effect may not show up if the cobalt is supplied in other ways.

However, a small group of trials in the series which compared the sulphate drench with the bullets showed depressions of about the same size to both. Further work is therefore needed to examine the effect of applying cobalt in different ways on those farms where depressions to cobalt administered as a bullet have occurred, and this the Department hopes to do this season.

No major areas were discovered where cobalt bullets were of benefit. Furthermore on many soil types on which cobalt deficiency had been demonstrated earlier no responses were obtained in this series of trials. In these districts a considerable amount of cobalt has been applied over the years with the result that the deficiency may have been overcome, at least temporarily. Also not all traditionally bush sick areas were examined thoroughly. However, a few good cobalt responses were recorded. There was one spectacular example of this at Matamata this last season. The cobalt treated animals gained 19 lb over two and a half months while the untreated animals gained only 5 lb.

The general tendency of cobalt bullets to depress liveweight gains slightly should not discourage the use of cobalt in areas where its value has already been demonstrated in earlier work. However, the use of cobalt bullets may do more harm than good on farms which are not cobalt deficient. Farmers intending to use cobalt for the first time would be wise to consult their local Departmental field officer first.

Interactions of Factors between Selenium and Cobalt

There was no evidence from this survey of any interaction between cobalt and selenium. That is, the response to selenium, say, was generally the same for those animals receiving cobalt as for those not receiving it.

Future Research

Areas not clearly classified, either because of relatively few trials or because of trials on these areas showing contradictory results, are to be studied more intensively in the coming season. Work is being continued to find the minimum quantities of selenium required to prevent ill thrift. The effect on the animal of cobalt applied as a topdressing rather than directly administered to the animal is also to be investigated. Experiments of this latter type are difficult to carry out precisely and only a small number will be possible.

Appreciation

The main survey discussed in this article consisted of approximately 700 trials almost all of which were carried out by Farm Advisory Officers, Veterinarians, and Livestock Instructors of the Department on the properties of farmers whose cooperation the Department greatly appreciates.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given during November as follows:

1XH Hamilton, 12.33 p.m.

13 November—"Better Hay for Better Feeding", by J. R. Murray, Farm Advisory Officer, Department of Agriculture, Hamilton.

20 November—"Magnesium and Soil Fertility", by D. E. Hogg, Senior Scientific Officer, Soil Research Station, Hamilton.

27 November—"Foot Rot in Sheep", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

8 November—"Livestock Notes", by V. Senior, Veterinarian, Department of Agriculture, Tauranga.

22 November—"Seasonal Beekeeping", by D. A. Briscoe, Apiary Instructor, Department of Agriculture, Tauranga.

2XA Wanganui, 8 p.m.

2 November—"For the Country Women", by Mary Macdonald.

9 November—"Farming News".

16 November—"Healthy Housing of Pigs", by E. M. Bailey, Supervisor, Taranaki District Pig Council.

23 November—"The Efficient Use of Fertilisers", by A. K. Booth, Farm Advisory Officer, Department of Agriculture, Wanganui.

30 November—"Horticultural Notes", by G. N. Paulin, Horticultural Instructor, Department of Agriculture, Wanganui.

2XP New Plymouth, 8 p.m.

2 November—"News and Views from the Farm Advisory Division", by B. R. Hedley, Fields Instructor, Department of Agriculture, New Plymouth. Peter Weenink's Y.F.C. session.

16 November—"Manufacture of Cheese and Casein", by F. W. McKeown, Dairy Instructor and Grader, Department of Agriculture, New Plymouth.

23 November—"Radio Vet.", by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

2YZ Napier, 7.10 p.m.

7 November—"The New Zealand Meat Inspector", by C. P. Bell, Meat Inspector, Department of Agriculture, Hastings.

21 November—"Seed Certification", by F. H. Collin, Instructor in Agriculture, Department of Agriculture, Hastings.

2XG Gisborne, 8 p.m.

7 November—"Maori Farm Improvement", by H. de O. Chamberlain, Farm Advisory Officer, Department of Agriculture, Gisborne.

14 November—"For the Orchardist", by J. Overbye, Horticultural Instructor, Department of Agriculture, Gisborne.

21 November—"An Intelligent Selection of Young Breeding Stock", by S. W. Rees, Supervisor, Bay of Plenty District Pig Council.

28 November—Gisborne Veterinary Club Session.

2XB Masterton, 6.45 p.m.

10 November—"Soil Conservation", by M. King, Chief Soil Conservator, Wairarapa Catchment Board.

24 November—"Management of Sow and Litter", by R. Thompson, Supervisor, Wellington District Pig Council, Masterton.

3YA Christchurch, 12.20 p.m.

6 November—"Stock Diseases", by A. C. Howse, Veterinarian, Department of Agriculture, Christchurch.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

6 November—"Stubble Management", by J. G. Richards, Farm Advisory Officer, Department of Agriculture, Oamaru.

13 November—"Internal Parasites", by C. E. Isaacs, Veterinarian, Department of Agriculture, Invercargill.

20 November—"Beekeeping as an Occupation", by G. L. Jeffery, Apicultural Advisory Officer, Department of Agriculture, Gore.

27 November—"Economics of Farm Mechanisation", by E. J. Stonyer, Farm Advisory Officer (Economics), Department of Agriculture, Dunedin.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 12.33 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report", followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays, 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer") and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XB Masterton, Fridays at 6.45 p.m. ("Farm Session").

2XN Nelson, Thursdays at 8. p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest"), and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

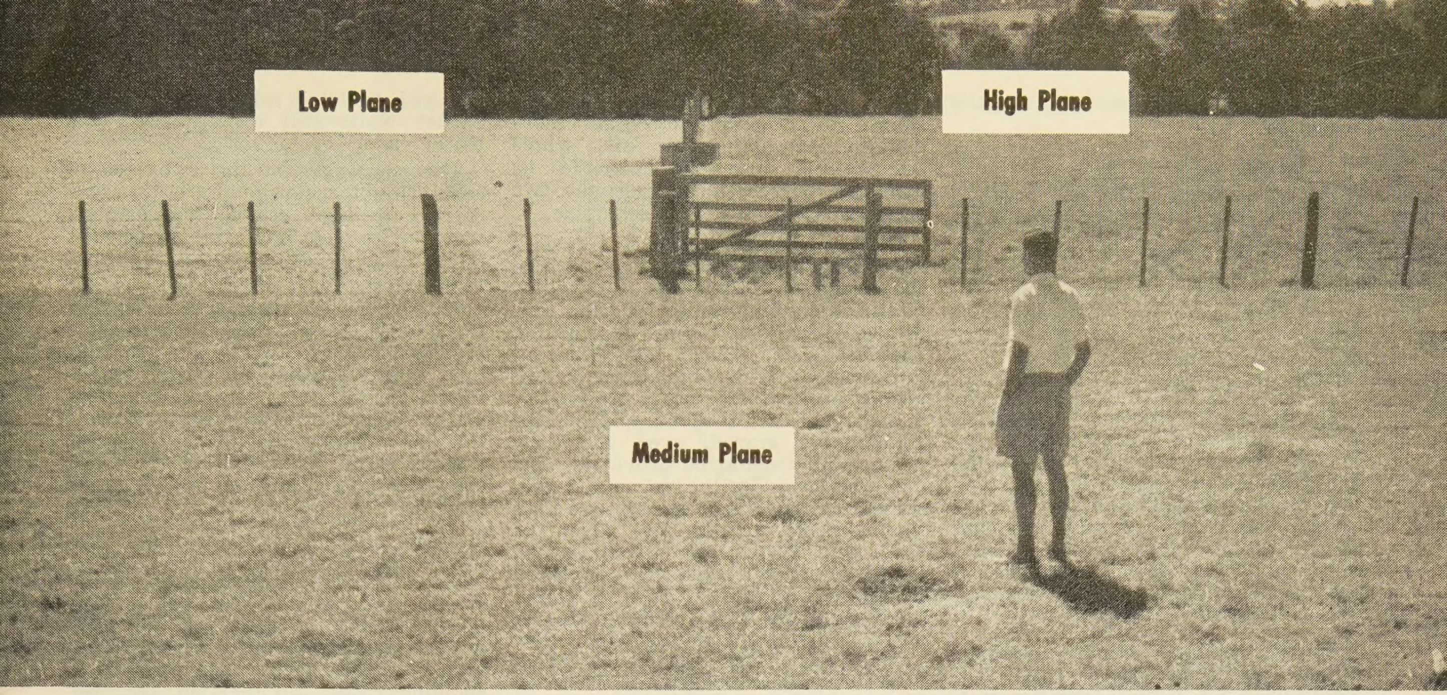
3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer"), and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service"), and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays, Wednesdays, and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m. ("News for the Farmer").



HEADING PHOTOGRAPH: Paddocks showing differences in amount of feed available to the three groups of ewes. (See text page 312.)

Ewes should not be Deliberately Hard Grazed after Weaning

HOW should ewes be managed in the two or three months after weaning? This has traditionally been regarded as a time when they need not be particularly well fed. However, two years' trials at the Department of Agriculture's Ruakura Animal Research Station have shown that it can be very poor practice to overdo starving their condition off them. The effects on ewes of different levels of feeding during the period between weaning and the start of flushing, as disclosed by the trials, were discussed by L. R. WALLACE, Assistant Director of Ruakura, at this year's Ruakura Farmers' Conference. There did not appear any good reason, he said, for grazing ewes any harder after weaning than was necessary to ensure sufficient feed for the lambs, cull ewes, cattle, and for flushing. An adaptation of Dr Wallace's paper follows.

IN New Zealand, particularly in the North Island, grassland farming is the rule. On the majority of sheep farms no crops are grown and pasture provides the sole diet of the ewe flock from one year's end to another.

Under these circumstances the only way the farmer can control the nutrition of his animals is through the methods of pasture and grazing management he uses. Provided a farm is adequately subdivided, much can be done by skilled grazing management to even out seasonal fluctuations in the feed supply and ensure that adequate feed is made available to the flock during periods of critical importance.

Obviously if best results are to be obtained from subdivision and grazing management, it is essential to have detailed and precise knowledge of the way that ewes can be expected to respond to different levels of feeding at various times of the year. A considerable amount of work has already been done at Ruakura to obtain just this type of information.

Not unnaturally, in the early studies attention was concentrated on those periods thought likely to be of most critical importance. Thus the flushing of ewes was thoroughly investigated and the effect of subjecting ewes to different levels of feeding during the last few weeks before lambing studied. The results of these and other studies provide the necessary information on which to base sound grazing management procedures at these times of the year.

Tendency to Graze Ewes Hard

Recent studies at Ruakura have been designed to obtain information on the way ewes respond to different levels of feeding at a time of the year which has in the past commonly been regarded as of much less critical importance: the two or three months after weaning in December or early January until, perhaps, about mid February, when an attempt is made to start flushing the ewes in preparation for mating during March.

Traditionally, this period after weaning has been regarded as the "cheap feed" period; a time when the ewes need not be particularly well fed, when they can be grazed together as one mob and used to clean out paddocks containing rough feed, and when they are often deliberately grazed very hard indeed with a view to conserving the best of the feed available for such purposes as fattening cattle and finishing the lambs remaining on the property.

At the time of weaning (December or January) ewes on fat lamb farms are often in high condition, and among farmers the view is widely held that those which are to be retained for further breeding should not be allowed to put on more condition and become too fat. It is not surprising that this should be the common view, for it has often been stated that fatness is a cause of infertility.

The generally accepted view has been that the condition most conducive to high fertility is a good improving one before and during tupping, and that fatness or over-condition is to be avoided as tending toward sterility; and further, that this improving condition is much more easily achieved if the animals are not in too high condition when flushing is begun.

There is certainly abundant evidence in scientific literature to show that where ewes are in store condition very substantial increases in lambing percentages can be obtained by providing them with an improved level of feeding both during the two or three weeks before the rams are put out and during the first few weeks of the mating period; and results obtained at Ruakura lend full support to this.

On the other hand, I know of no evidence to support the view that higher lambing percentages will be obtained from ewes deliberately prevented from becoming fat or reduced in condition before flushing than from ewes well fed from weaning right through until mating. The question is obviously quite an important one to New Zealand sheep men, many of whom do not like to see their ewes becoming too fat after weaning, and often take considerable trouble to prevent this.

Ruakura Evidence Raises Doubts

Evidence which has been accumulating over a number of years at Ruakura has made me seriously doubt the wisdom of deliberately attempting to take the condition off fat ewes after weaning by subjecting them to partial starvation. For the last 13 years a flock of mixed age Romney ewes which has been maintained on the Station has each year been weighed in February before the introduction of the rams.

The average liveweight of the flock has varied considerably from year to year, owing mainly to seasonal variation in the feed supply, but what has been most noticeable and interesting is that in years when the ewes were in high condition and heavy at the start of mating the subsequent lambing percentages have usually been high. In years when the ewes were in poor condition and light, low lambing percentages have been obtained.

Just over two years ago trials were started at Ruakura to obtain more definite information on the whole question of how ewes should be managed after weaning, and the two seasons' results are now available.

In late December 1958, a few days after their lambs had been weaned 360 six-year-old Romney ewes which had been running under fat lamb conditions at Ruakura the previous season were weighed, graded for degree of fatness, and divided into three similar groups each of 120 ewes. Thereafter one group, called the "high plane", was rotationally grazed over the best pastures that could be provided. The aim was to induce the animals to gain weight as rapidly as possible so that they became grossly fat. Over the same two months the second group, called the "medium plane", was grazed rather harder with a view to somewhat reducing the condition of the ewes. The third group, the "low plane", was grazed very hard indeed with the object of getting the ewes quite thin by mid February.

Record of Tupping

At the end of the second month (in mid February), some three weeks before fertile rams were turned in with the ewes, the three groups were combined and thereafter grazed together on the best pastures that could be provided. Later they were mated as a single flock.

From early February onward two raddled vasectomised (teaser) rams had been run with each group of ewes to see whether the different levels of feeding had any influence on the way the ewes came into season. The teaser rams remained with the combined flock until early March, when they were replaced with fertile rams equipped with tupping harness so that a record could be obtained each morning of any ewes that had been tupped during the previous 24 hours.

One of the objectives of the trial has already been mentioned: to find out whether the different levels of feeding has any influence on the way the ewes come into season. A second objective was to discover how the different levels of feeding after weaning affect the number of eggs produced by the ewes when they come on heat during the mating period.

Accordingly, from the time the fertile rams were introduced a record was kept of the order in which the ewes came into season, and a quarter of the ewes from each group were killed two to three days after they had been mated. The breeding organs were recovered at slaughter. By examining the ovaries at this stage it was possible to determine not only the number of eggs that had been produced at the time the ewe was mated two and three days before being killed, but also the number of eggs each animal had released at the time she had ovulated some 16 to 17 days earlier while still running with the teaser rams.

The remainder of the ewes (90 in each of the three original groups) were carried through winter and lambed together to see how the treatments after weaning affected the lambing percentages.

The experiment was repeated during the 1959-60 season. The same number of animals were used and essentially the same procedures were again followed. In both seasons the ewes were weighed at intervals throughout the post-weaning, flushing, and mating periods. The liveweight changes are shown in the graphs on the opposite page.

Results in Trials

The high plane ewes put on condition quite rapidly at first, but as they became really fat their rate of liveweight increase slowed down. By the middle of February, when they were combined with the medium and low plane ewes, they had reached their maximum weight. An interesting feature shown by the liveweight graphs is that after the three groups of ewes were combined in mid February the excessively fat high plane animals lost weight for the first two or three weeks, whereas the medium and low plane ewes, grazing the same pastures, gained weight quite rapidly.

Effect on Fertility

The first point of interest in the results obtained is that in neither year did the different feeding treatments have any substantial effect on the onset of the breeding season. All three groups started coming on heat at about the same time. The ewes of the medium and low plane groups took the ram just as soon—in fact a little earlier—than the ewes in the high plane group.

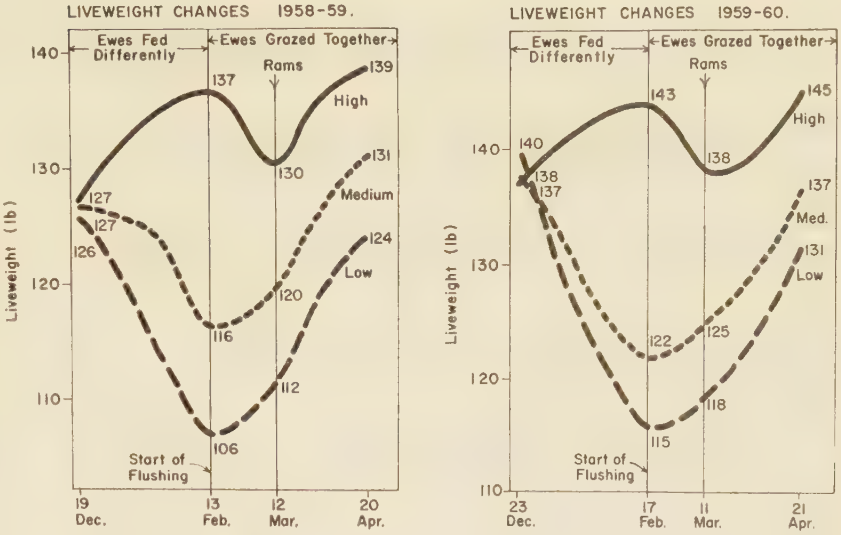
However, the different levels of nutrition to which the ewes were subjected after weaning did effect the ease with which the ewes got in lamb. Table 1 shows the percentage of the ewes that lambed which became pregnant at first service. The average figures for the two years show that, whereas about 90 per cent of the high plane animals conceived at first opportunity, only 84 per cent of medium plane ewes and only 80 per cent of the low plane ewes did.

In each group the ewes which returned to service tended to be thinner than average animals. The results obtained lend absolutely no support for, and indeed contradict, the view that fat ewes are more difficult to get in lamb than thin ewes.

The average results for the two seasons show that there were more dry ewes in the medium and low plane groups than in the high plane group. Examination of the records of the animals which failed to conceive

TABLE I—EFFECT OF LEVEL OF FEEDING (Mid December to Mid February) ON REPRODUCTIVE PERFORMANCE OF EWES (Average results for two seasons)

	High plane	Medium plane	Low plane
Per cent of ewes lambing which held to first service	89.4	84.0	79.7
Per cent of dry ewes	2.7	4.3	6.7
Per cent of ewe deaths	5.5	6.5	6.1
Average number of lambs per ewe lambing	1.51	1.34	1.35
Per cent of lamb deaths (birth to 28 days)	13.7	11.2	16.6
Lambing percentage (lambs alive at 28 days as per cent of ewes mated) ..	120	107	98


EWES SHOULD NOT BE HARD GRAZED AFTER WEANING

showed that these were mainly very thin animals, weighing either less or not much more than 100 lb. Clearly in these trials fatness has not caused increased infertility.

Ewe Deaths

The percentage of ewes which died varied somewhat in the two years, but on average was very similar in all three groups. The small differences between groups could easily have arisen by chance.

Lambing Percentages

Lambing percentages can be calculated in various ways. The most important one from the practical farmers' viewpoint is that obtained by expressing the number of lambs docked as a percentage of the number of ewes mated. This percentage is, however, an overall measure affected by three important factors:

1. The percentage of ewes which die or fail to get in lamb.
2. The number of lambs produced by the ewes which lamb.
3. The death rate before docking among the lambs produced.

The percentages of ewes which died or failed to get in lamb has already been considered. In both seasons the high plane ewes produced more lambs than either of the other two groups. The death rate among the lambs was on average lowest among the medium plane ewes and highest among the low plane ewes, but this might well have been a chance effect.

The high plane ewes gave the best overall lambing percentage in both seasons. In the first year the final lambing percentage was slightly higher for the low plane ewes than for the medium plane, but in the second season the reverse obtained, and over both years the average lambing percentage was 9 per cent higher for the medium plane than for the low plane ewes.

There can be little doubt that the superior lambing percentage of the animals that were deliberately made and kept as fat as possible after weaning was largely the result of their producing on average a greater number of eggs at the time they were mated. The average numbers of eggs produced by the ewes that were killed is shown in Table 2.

Despite the fact that high plane ewes suffered a check when they were combined with medium and low plane ewes in mid February, their average rate of ovulation was quite high (1.67) during the three weeks before the

First Winner of Travel Award for Agricultural Journalists

MR D. L. FYFE (left), first winner of the New Zealand Guild of Agricultural Journalists' Bank of New South Wales Award, was presented with the award by Mr R. S. Brittain, chief manager for New Zealand of the Bank, at a function in Wellington recently. The award, which takes the form of a travel grant of £100, is given for an outstanding contribution by a member of the Guild to the furtherance of agricultural knowledge and understanding. Mr Fyfe, who is agricultural editor of "The Press", Christchurch, will visit Australia next year to see farming there.

FOR USE AFTER ASSISTED LAMBING TO PREVENT BLOOD-POISONING AND BLACKLEG IN SHEEP.

FOR FOOTROT IN DAIRY COWS, CATTLE AND PIGS.

FOR ARTHRITIS IN LAMBS AND PIGS.

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Pronounced PRO-KAL

hypodermic penicillin

For intramuscular injection!

Three Strengths

'100' (Lambs) Arthritis, etc.

'500' (Ewes) At Lambing, etc.

'1500' (Cattle & Pigs) Footrot, etc.

In flat tins with hypodermic needle

MANNINGS HAMILTON

VETERINARY LABORATORIES

MANNINGS
PROCAL

THE GREAT EWE SAVER AT LAMBING TIME —

PROCAL

(pronounced Pro-kal)

Blackleg in sheep, more commonly referred to as blood poisoning, usually results from infection of wounds, such as occur at shearing, dipping, lamb marking, docking or in ewes while lambing. This is understandable when it is realised that the blackleg germs are frequently found in the wool and on the skin of normal sheep and in the soil and pastures.

Prevent Ewe Losses at Lambing Time

Blackleg losses in ewes associated with lambing are prevalent during the lambing season, and ewes assisted at lambing almost invariably die unless an intramuscular injection of Procal (pronounced Pro-kal) Hypodermic Penicillin 500 is given immediately after each operation. A further injection after 24 hours—as a preventive measure—should follow. At lambing most cases are due to infection from shepherds' hands; an immediate injection of Procal will kill the bacteria before it can attack.

Navel Ill or Arthritis in Lambs

Navel Ill or Arthritis is a bacterial infection causing an inflammation of a joint and sometimes death. These bacteria enter the body either through the undried navel cord soon after birth or through wounds, such as occur at castration, docking and ear-marking. They then reach the joints via the bloodstream. Affected lambs are lame on one or more legs, or may show a general stiffness, a few days to a week or more after marking, and death may occur quite quickly.

Treatment and Prevention with Procal

Navel Ill and Arthritis frequently causes death unless treated with Procal. A preventive injection of Procal immediately after each operation will attack the bacteria in the bloodstream. For small lambs, inject one tube of Procal 100; and repeat as necessary. In acute cases, a tube of the stronger strength—Procal 500—is advisable.

Footrot in Cattle, Dairy Cows and Pigs

Many cases of footrot respond dramatically to Procal Penicillin. An injection of one or two tubes of '1500' strength with a repeat in 24 hours is recommended.

Procal is a laboratory proved formula of Procaine Penicillin and Crystal Penicillin. This combination provides the properties of the quick - acting crystal ingredient with the longer, more durable suspension of Procaine Penicillin.

TABLE 2—EFFECT OF LEVEL OF FEEDING (Mid December to Mid February) ON AVERAGE NUMBER OF EGGS PRODUCED BY EWES THAT WERE KILLED (average results for two seasons)

	High plane	Medium plane	Low plane
Average number of eggs produced per ewe:			
During 2-3 weeks before mating started ..	1.67	1.46	1.32
During first 2-3 weeks of mating period ..	1.77	1.58	1.53

fertile rams were introduced, and it increased (to 1.77) during the next 16 to 17 days. On the other hand, during the fortnight before the fertile rams were introduced the average ovulation rates of the medium and low plane ewes were much lower (1.46 and 1.32 respectively), and though the rates rose very markedly after mating began (to 1.58 and 1.53 respectively), they did not reach the high level of the high plane animals.

Effect on Wool Production

Each year the ewes had all been shorn at the same time (shortly before the trial was started in December) and they were shorn again the following December. Average fleece weights were:

	High lb	Medium lb	Low lb
1958-59	8.54	8.20	7.74
1959-60	9.71	9.27	8.61
Average of both seasons ..	9.13	8.74	8.18

On average the high plane ewes clipped nearly 0.4 lb more wool than the medium plane, and the medium plane between 0.5 and 0.6 lb more than the low plane ewes, so that the average difference between the high and low plane ewes amounted to almost 1 lb. In considering these differences it must be remembered that the only time the ewes were differently treated was during the two months from about mid December until mid February. All the ewes grazed together throughout the remainder of the year.

Main Findings

So much for the general nature of the results obtained. It may be worth while summarising the main findings:

1. The different feeding regimes to which the ewes were subjected after weaning had very little effect on the time of onset of the breeding season or the speed with which the ewes took the ram.

2. The ewes which were well fed from the time of weaning onward, and which, consequently became very fat before mating began, became pregnant if anything rather more readily than ewes which were at first hard grazed for two months after weaning and then flushed for three weeks before mating.

3. There were fewer dry ewes among the group well fed throughout the period after weaning.

4. The animals that returned to service and that failed to get in lamb were mainly ewes in poorer than average condition.

5. Deaths were not greater among fat ewes than among thin ones.

6. The ewes which were fed at a high level from weaning until mating produced the greatest number of lambs per ewe lambing and gave the highest overall lambing percentage based on the number of ewes mated.

7. The ewes well fed throughout the period after weaning produced more wool than did either of the other two groups.

Practical Application

What practical recommendations can be made? I would not for one moment suggest that farmers should deliberately set out to put as much condition as possible on their ewes after weaning. Often this would involve a most wasteful use of good feed that could more profitably be kept for other purposes, such as the finishing of lambs and the fattening of cull ewes and cattle.

But the results obtained do emphasise most strongly that it can be very poor practice indeed to overdo the process of starving the condition off ewes after weaning. There are good grounds for believing that this practice may be particularly harmful if there is any danger that as the breeding season approaches the ewes may have to be shut up and fed short commons as a precautionary measure against facial eczema.

Much can be done to ensure a good lambing percentage from thin ewes by putting them on an improved diet about two or three weeks before the start of tupping. If the risk of facial eczema prevents this being done, both the ewes and their subsequent lambing percentage are likely to suffer quite seriously.

On most farms a decision has to be made at weaning time how the feed available can be most profitably used. In the present state of knowledge it would seem wise to ensure that feed is conserved for flushing, even if this means having to do the breeding ewes fairly hard after weaning.

There does not appear to be any good reason for grazing the flock any harder after weaning than is necessary to ensure that sufficient feed is saved for the lambs, cull ewes, and cattle and also for flushing. If because of shortage of feed the breeding ewes have to be done fairly hard after weaning any animals in poor condition should be drafted off from the main flock and given preferential treatment. The main consideration is to keep all ewes in reasonably good order; avoid at all costs any of the ewes being in really poor condition when mating begins.

Mr H. Doyle to be Agricultural Adviser in London

MR H. DOYLE, until recently Livestock Superintendent, Department of Agriculture, Christchurch, will succeed Mr C. V. Dayus as Agricultural Adviser, London, who retires at the end of this year.

Mr Doyle was in private veterinary practice in England before accepting a position in the Department of Agriculture in Wellington in 1935. He was transferred to Christchurch shortly afterward, to Dunedin in 1936, and to Hamilton in 1940. He has been Livestock Superintendent, Christchurch, since 1945.

Mr Dayus, who will have completed 38 years' service with the Department of Agriculture when he retires, was a highly qualified and experienced veterinarian when he came to New Zealand from Britain in 1923 to join the Department. He was appointed Livestock Superintendent, Dunedin, after only six years' service (at Auckland and Hamilton).

Mr Dayus was Livestock Superintendent at Dunedin for 23 years until in 1952 he was appointed to London. There he has been responsible for keeping the Government informed about animal disease, farming developments, and various aspects of the marketing of meat and animal byproducts.

Mr Doyle.

Care of Livestock during November

By Wallaceville and Ruakura Animal Research Stations

KEEP BULLS OFF DDT-TREATED PASTURES

CONDITIONS laid down for application of DDT-superphosphate to pasture and for livestock grazing management of treated pasture in the Agricultural Chemicals (Insecticides) Regulations 1961 must be followed in bull paddocks just as closely as on the rest of the farm. The bulls must be removed from the field before application and not returned for four weeks; the pasture must be closely grazed before application; and the fertiliser must be applied at the rate stipulated in the advice note.

MILKING METHODS

Regularity and a good pre-milking stimulation are the keynotes to efficient milking. Early in the season cows should be trained to let down their milk quickly and completely by the establishment of a fixed milking routine in which they are brought into the shed, bailed up, washed, stimulated, and milked in the same way each day. Anything which upsets the cows or deviates from the normal milking pattern should be avoided. Nervous cows should be treated carefully and quietly and should not be left to the last before milking.

Cows should be stimulated before the cups are applied. A wash and massage of the teats and lower portion of the udder for 30 seconds, followed by the withdrawal of a squirt of milk from each quarter, has been found at Ruakura to increase total milk production by over 30 per cent. Adequate stimulation not only increases milk production but reduces milking time by over one minute per cow. The withdrawal of milk from each quarter will help in the detection of mastitis.

As the duration of milk let-down is limited, the cups should be applied immediately after stimulation. When the milk flow indicator shows that the flow rate has fallen to about ½ lb per minute, the cups should be removed at once. Cows known to require machine stripping should have the cups pulled down or "weighted" while the flow rate is still about 1 lb per minute.

If there is any tendency for sores or cracks to appear on the teats, apply a non-greasy antiseptic ointment **after** the cups are removed.

MATING BEEF COWS

Mating should begin this month and continue until January. A restricted mating season should be practised with the aim of early weaning of calves so that all cows are freed for scrub control. The herd should be paddock mated in small mobs with a single bull. Change the bulls every three weeks. Two-year-old heifers suckling calves should be given preferential treatment at this stage.

BLOAT

The most reliable method of bloat control is total area pasture spraying with anti-foaming agents such as vegetable oils, liquid paraffin, or tallow at the rate of not less than 3 fl. oz. of oil per cow per day. Common faults are too low an application rate or improper emulsifying of the material.

Satisfactory control of mild bloat can be achieved by drenching with 2 to 4 oz of peanut or linseed oil or paraffin. With severe bloat more drastic measures are required. The animal should be stabbed in the region of the left flank with trocar and cannula and the gas allowed to escape slowly. Where frothy material blocks the cannula a large enough knife gash should be made to allow the whole arm to be inserted and the stomach contents scooped out. After such treatment a veterinarian should be consulted.

CONTROL OF FAT LAMB PASTURE

Pastures on which ewes and lambs are grazing should never be allowed to become rank. If pastures are getting too long, they can best be controlled by cattle. Yearling beef cattle soon become quiet and they can then be run with ewes and lambs even in small paddocks.

SHEARING PREPARATIONS

Preparations for shearing should be made now. Attend to sheepyards and scrub out the woolshed. This will reduce trouble from such diseases as blood poisoning, tetanus, and caseous lymphadenitis (lympho) after shearing. Check over all machinery to see that all parts are in good working order. Dag all dirty sheep and shear hoggets, wethers, dry ewes, and rams. When culling sheep before shearing pay particular attention to teeth, udder, and dropped belly. On fat lamb farms ewes are best shorn after one or two drafts of lambs are away.

HYDATID CONTROL

The safe disposal of sheep offal for the control of hydatid infection is especially important during shearing time. At this time of the year there are extra dogs which require extra feeding, and the aged sheep used for this purpose are most likely to harbour cysts. During this busy period extra vigilance is necessary to see that offal is dealt with safely.

DIP RAMS EARLY

Rams should be dipped before they begin to flush, preferably before Christmas; flushed rams sometimes scald after dipping.

CARE OF PIGS

Dry sows should have access to good pasture and in addition should receive from 2 to 4 gallons of milk per day, depending on their condition. They should be kept thriving, but should not be allowed to become too fat. Keep only as many of the spring litters for baconers as can be fed adequately and sell the remainder as porkers.

VACCINATION AGAINST CONTAGIOUS ABORTION

Vaccination has greatly reduced the rate of abortion in dairy cows. There are, however, still too many dairy farmers who do not vaccinate their calves. Past freedom from abortion is no excuse for not vaccinating, as infection may be introduced into a herd at any time. Though vaccination does not begin until January or February, applications should be made now, as veterinarians and Livestock Instructors have to plan their vaccination itineraries. Late applications make this planning difficult. Calves should not be vaccinated until they are over four months. Poor immunity results if they are vaccinated before this. Bull calves should not be vaccinated.

Beef cows are just as susceptible to contagious abortion as dairy cows. By vaccinating heifers before mating many farmers have been able to increase the calving percentage of their beef cows very considerably.

Seasonal Notes

By Farm Advisory Division

DECIDING ON AREAS TO HARVEST FOR SILAGE

ONLY pasture which is surplus to the immediate feed requirements of stock should be closed for harvesting as silage; otherwise herd production will suffer at a time when adequate feeding and good production are especially important. Where harvesting is done by the conventional method of mower, buckrake, and so on, the decision on which paddocks to close is made easier by adequate subdivision, as this allows the closing of small areas one by one as the pasture growth rate increases over the farm. Adequate subdivision also allows better control of those paddocks not closed.

Within the limits imposed by contour and subdivision, the paddocks closed should be the more fertile ones which are ryegrass and white clover dominant. Red clover paddocks are often closed for silage because they are apt to cause bloat, but though this is generally a sound practice, it should be realised that such treatment will tend to increase the proportion of red clover. Pastures under two years old, and those containing much Yorkshire fog and cocksfoot should be grazed where possible.

If a forage harvester is used for harvesting silage, the paddocks do not need to be closed for as long as when the mower is used. In fact, most of the advantages of the forage harvester are lost if it is used on heavy crops. Apart from the advantage of reducing the man-hours required to harvest silage, the forage harvester is able to deal very effectively with large areas of light crops. This results in less pasture deterioration than when heavy crops are mown, and the aftermath is also generally better. Intensive subdivision, confining the harvest to small areas, becomes unnecessary.

The forage harvester may be used in several ways. It may follow the herd by about a week or ten days round the farm, or it may be used to gather toppings immediately the cows leave the paddocks. Alternatively individual paddocks may be dropped from the grazing rotation for two to three weeks to allow a light silage crop to be taken. Whichever system is chosen the result is that most of the farm is cut at least once and pastures are well controlled. There is no need for topping and the herd can be given freer range over a larger area at each grazing, which soon improves production.

—*B. A. GUNNING, Matamata*

* * *

SWEDE VARIETIES FOR NORTH ISLAND

THOUGH the area of swedes grown for winter feed in the North Island has declined considerably over the last 10 to 15 years, good crops can be grown. However, careful attention must be given to paddock selection, cultivation, seed, fertiliser, and the early control of cutworms and other insect pests. A serious weed problem may be overcome best by using a swede ridger and a scuffler for inter-row cultivation. One of the most important factors is selection of suitable varieties.

N.Z. Superlative: Its high susceptibility to aphids and virus diseases is the main reason for many poor crops. Can be recommended only in disease free areas where there is little likelihood of aphid attack.

N.Z. Sensation: A purple-topped variety most resistant to aphid attack and virus diseases. Bred for light land, but grows well under North Island conditions.

N.Z. Grandmaster: A good variety in most North Island districts.

N.Z. Calder: Resistant to aphids and virus diseases. A good late hard swede not suitable for early feeding.

N.Z. Crimson King: Mainly confined to colder areas.

N.Z. Wilhelmsburger: Very hard; good for late winter feeding.

N.Z. Wye: Clubroot resistant. Recommended only where clubroot is known to occur.

N.Z. Doon Major: An early, softer type of swede showing outstanding promise in many North Island districts. A good yielder with more resistance to aphids and virus diseases than Superlative, which it might well replace as seed supplies become available.

N.Z. Doon Spartan: Has shown promise as a likely replacement for the Wilhelmsburger type. Has good resistance to aphids and virus diseases.

The supply of Doon Major and Doon Spartan seed is as yet very limited.

For the coming season the best varieties to sow are Sensation and Grandmaster (for the early part of winter), Calder and Wilhelmsburger (for late feeding), and Wye where clubroot is a problem. Crimson King is quite good in the colder climates. Superlative should be grown only in disease-free areas where experience has shown that good crops can be obtained.

—*A. K. BOOTH, Wanganui*

* * *

IRRIGATION OF SWEDE CROPS

SWEDES should not be irrigated until there is a considerable leaf cover over the soil, usually six to eight weeks after sowing. Earlier irrigation can result in a severe check to growth from nitrogen deficiency and soil compactions; frequently the crop never fully recovers. If the soil is too dry for a quick strike, it is better to irrigate the paddock before sowing than to risk damaging small seedlings by irrigating the crop too soon.

Later irrigations should aim at keeping the plants growing through periods of low rainfall without over-watering. The crop when in need of water takes on a distinct bluish colour. If water is withheld wilting occurs, growth ceases, and there is premature loss of older leaves. Loss of leaf should of course be avoided by irrigating when the change to bluish leaf colour occurs. Temporary wilting in the heat of day is not an indiciation of the need for irrigation.

The frequency of irrigation required depends mainly on rainfall, but generally crops should not be irrigated more than once a month even in the driest season.

The amount of water applied at each irrigation should not exceed the minimum required to saturate the soil throughout the root zone. With sprinklers this can be done fairly accurately by controlling the rate and period of application. With flood irrigation less precise control of the amount of water applied is possible and usually applications are excessive. The two main methods of control are: to reduce the length of run of water to 5 or 6 chains; to grow the swedes on ridges and furrow irrigate. The aim should be to irrigate at least 1 acre an hour with a stream of 8 cusecs. Slower irrigation results in grossly excessive applications and usually indicates that the length of run is too great.

Heavy weed growth in the bottom of the crop slows up irrigation; hence the importance of thorough seedbed preparation, even sowing, and weed control. As water requirements of the crop are reduced by good nutrition, adequate manuring according to local conditions reduces irrigation needs.

The swede crop responds well to irrigation, but farmers generally tend to over-irrigate. A good rule with this type of crop is: "If in doubt don't irrigate".

—*B. A. LAUDER, Ashburton*

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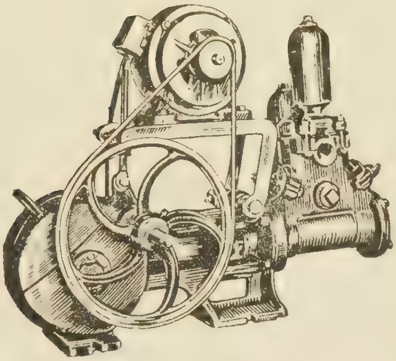

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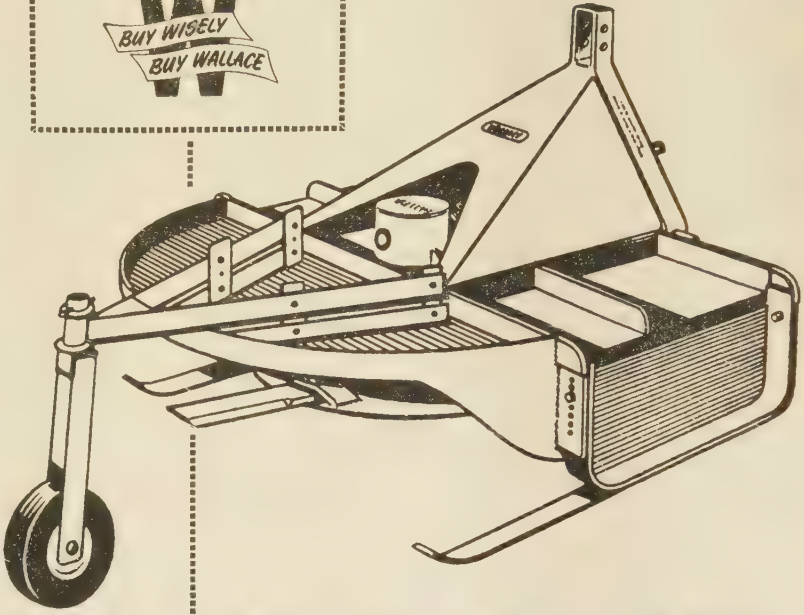

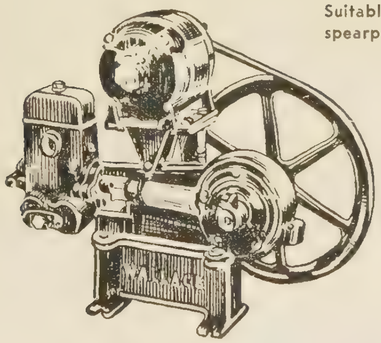

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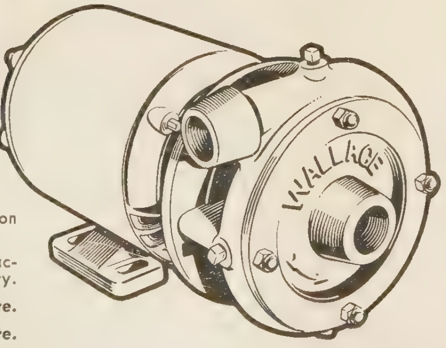

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BRANCHES AND AGENCIES THROUGHOUT NEW ZEALAND

THE RUAKURA MILK METER
Individual cow production at a glance.
Milk sample for testing if required
Completely ... tic - no b... fo...
...leaned ... nt.

CENTRE of keen dairy farmer interest at the Farmers' Conference field day at the Department of Agriculture's Ruakura Animal Research Station in June was the new milk meter developed at the Station. D. S. M. Phillips (extreme left above), Principal Scientific Officer, discusses a meter displayed at No. 1 Dairy, from which most of Ruakura's revolutionary advances in milking methods and measurement of the effects of milking techniques have emanated. In a paper to the conference, an adaptation of which follows, Mr Phillips described the new meter and the likely advantages of its use in the dairy industry.

THE need for a milk meter to measure the production of individual cows as they milk has long been recognised. Several attempts have been made by private individuals to design such a meter, but so far none has been able to produce a unit of the required accuracy at a reasonable cost. In spite of the obvious value of a cheap, accurate milk meter to farmers, no money has ever been forthcoming for its development, and the development of the present unit was only incidental to the development of milk flow recording apparatus designed by Ruakura for research on milking.

The methods used in this milk meter are almost certainly not the only way of doing the job, and possibly not the best way. I have considered a number of possibly useful ideas, but these are unlikely to be made and tested unless facilities and manpower are available. The present meter represents a fairly simple solution to the problem which did not involve much development work. So far it has met the requirements very well, and it may yet prove to be one of the most successful methods.

Method of Use

The meter has been designed to operate between the cow and the milk line of the milking machine so that it meters the milk as it passes into the milk line. The weight of milk will be shown on a dial reading in pounds. At the end of each cow's milking the total weight of milk can be read off the dial and the numbers returned to zero ready for the next cow. If the farmer does not wish to read the meter, he can ignore it and the cows will continue to milk through it in the normal way. Because it meters the milk continuously, there is no need to wait for draining, and the cups can be placed on another cow immediately.

Sampling

Provision is made for sampling of the milk for testing. At the moment, a proportional sample is collected in a bottle hung below the unit; a subsample would need to be taken from this. If no sample is required, the sampling attachment is removed. If necessary, provision could be made for taking samples of different proportions to suit cows with different levels of production.

Applications of the Milk Meter

The meters are being considered for use by herd improvement associations. Herd testers would carry these meters instead of the usual bucket type milker. This could be a great advantage, because it would eliminate the need for weighing of each cow's milk and difficulties which invariably arise when clumsy and noisy buckets are introduced to a milking shed.

Use by Farmers

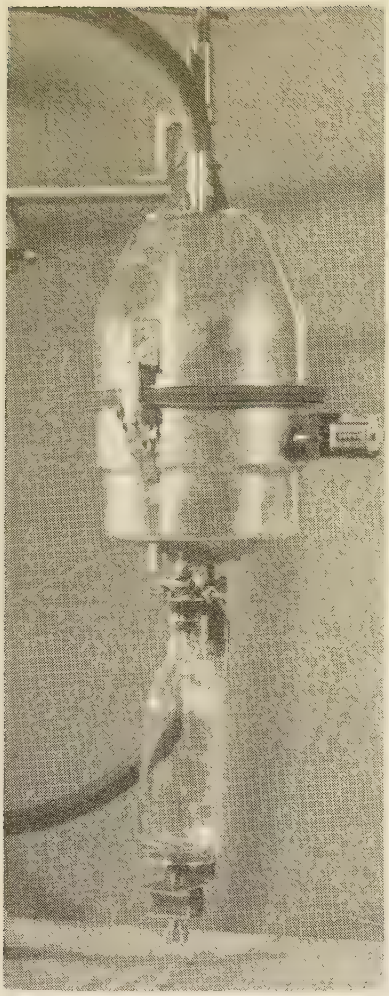
Ultimately, if the price can be kept to a reasonable figure many farmers may equip their sheds with these units. A milk meter will prove very valuable in many respects.

1 It will allow the farmer to test his cows readily, provided suitable facilities are available for doing a butterfat test periodically. The introduction of a meter at the right price might well have a very great effect on the future development of herd testing.

2 It will allow him to follow the day-to-day production of individual cows as a check on milking efficiency. Fluctuating productions can indicate inadequate milking practices.

3 It will allow him to follow the end-of-season production of cows so that drying off can be done at the proper time.

4 Perhaps most important of all, it will enable farmers to follow the production of cows from day to day, thus increasing the interest in the



milking process and ensuring that every effort is made to improve this aspect of farm management.

Use for Milk Flow Recording

In designing the meter I have had in mind the possible future value of recording a cow's milk flow curve at milking time, a technique which we have used very successfully for a number of years in the study of milking behaviour. Milk flow recording may well prove one day to be as important as production testing in the selection of milking cows.

The present unit will be made with provision for the connection of a simple milk flow recorder unit so that, if required, a field technician can connect a recording unit to the meter and record the milking characteristics of individual cows. The present work at Ruakura on the measurement of let-down response suggests that the measurement of this factor may well play an important part in management and selection in future, and its incorporation at this stage may well prove very important.

← COMPONENTS

The meter consists of five essential parts:

1. The top chamber, which carries the input nozzle.
2. The flow controller and froth separator, which feed the milk to the tip tray.
3. The bottom chamber, which holds the tip tray.
4. The tip tray.
5. The sampler unit which is attached at the bottom.

The meter uses a principle, the balanced tip tray, which is not at all new. The patentable features of the present meter are devices which have made it possible to reduce very substantially the errors to which the simple tip tray system is prone. This system has an inherent error which is related to the rate of inflow of milk and is also greatly affected by the peak flow rate.

This source of error was located and a means of compensating for it invented. The devices appear to have been extremely effective. Firstly, the high peak flow rate due to the pulsation has been smoothed to a more uniform flow, and secondly, the dependence of accuracy on the average rate of inflow has been eliminated by incorporating a simple compensating device in the tip tray.

Accuracy

The production prototypes have been field tested on a number of farms. Ten or 12 cows in each herd have been milked for 10 milkings and the milk meter readings have been compared with the weight of milk obtained in a bucket and weighed on a standard dairy scale.

Over a series of tests the milk meter readings were within 1 per cent of the weighed amounts. The individual milking figures did not vary from the weighed amounts by more than 6 oz. The cows used in these tests were at all levels of production and had a range of milking rates.

Under field conditions the use of the bucket and dairy scale is also subject to considerable error, and an agreement of better than 1 per cent can be considered very good indeed.

Conclusion

It appears that the prototype production unit of the milk meter will be able to meet the requirements as far as accuracy is concerned, and also meet most of the other requirements of size and robustness.

Much work has still to be done, however, before full production can be started, and much field testing will still be required to ensure the continued accuracy of the meter and to test its reliability under field conditions.

Acknowledgments

Much credit is due to the following for their work on the development of the meter: Mr E. M. Phillips for making the original prototype and for many helpful suggestions: Mr P. Hollis for his work on the meter at Ruakura; and Mr J. Partington, of the National Dairy Association, for his untiring efforts in the development of the production unit.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during July 1961 and for the 12 months ended 31 July 1961 with comparative figures for the same month and the 12 months of 1959-60 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
July 1961	2,665	7	2,672	—
July 1960	2,728	9	2,737	—
Decrease	—63	—2	—65	—2.375
12 months ended 31/7/61	164,390	3,182	167,572	—
12 months ended 31/7/60	161,418	2,986	164,404	—
Increase	+2,972	+196	+3,168	+1.926

Butter in store at 31 July 1961 was 6,639 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
July 1961	16	—	16	—
July 1960	135	—	135	—
Decrease	—119	—	—119	—88.148
12 months ended 31/7/61	80,928	12,280	93,208	—
12 months ended 31/7/60	75,901	11,316	87,217	—
Increase	+5,027	+964	+5,991	+6.869

Cheese in store at 31 July 1961 was 8,712 tons

If these figures are converted into butterfat equivalent, there is an increase of 2.883 per cent in butterfat graded for the 12 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese used on the local market and other products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

☆

WEED IDENTIFICATION AND CONTROL

Mayweeds and Chamomiles

This is one of a series of articles illustrated in colour to appear in the "Journal" from time to time in which identification and control of various weeds will be discussed.

← *Anthemis* spp. or *Matricaria* spp.? It is impossible to tell from such a photograph, but the species was identified by the method described in this article as *A. cotula.*

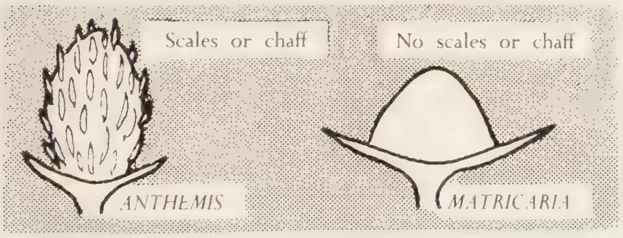
By L. J. MATTHEWS,
Principal Scientific Officer,
Department of Agriculture, Wellington

THE mayweeds and chamomiles belong to the family *Compositae* (the daisy family), but the common names include species of two genera *Anthemis* and *Matricaria*. The following classification is by A. J. Healy, Assistant Director, Botany Division, Department of Scientific and Industrial Research, Christchurch:

IDENTIFICATION of species in the genera *Anthemis* and *Matricaria* presents problems in that only in the flowering and fruiting stages can identification be made with any degree of accuracy. A further complication is the use of common names "mayweed" and "chamomile" for species in both genera and that some species in both groups are aromatic.

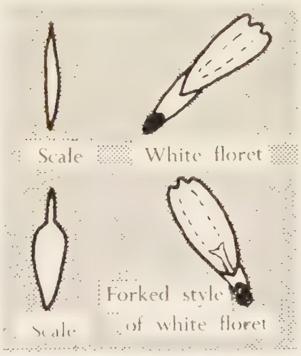
Though it is not a very convenient character to investigate, the absence or presence of scales between the individual florets of the daisy-like heads is the only sure way of distinguishing between *Anthemis* and *Matricaria*; in *Anthemis* they are present and in *Matricaria* they are absent.

If you take a flower head or seed head of a mayweed or chamomile and remove or tease off the yellowish florets in the centre of the flower, no scales or chaff will be found remaining on the surface of the receptacle of *Matricaria*, while in *Anthemis* distinct scales or chaff project from the surface (see sketches).



The presence or absence of scales or chaff having decided to which genus the plant belongs, the species may be distinguished as follows:

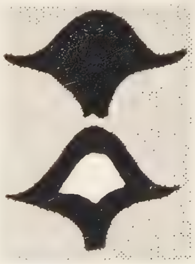
***Anthemis* (scales or chaff present)**



A. cotula (stinking mayweed): Strong smelling herb; scales or chaff of head long and narrow (awl like); white outer florets of flower head without forked style.

A. arvensis (corn chamomile): Scarcely scented herb; scales or chaff of head broad based with long, slender tip; white outer florets of flower head with forked style.

***Matricaria* (scales or chaff absent)**



M. inodora (scentless mayweed): Scarcely scented herb; receptacle of flower head (central portion of head on which the florets are borne) solid, flat at first, becoming conical in fruit.

M. chamomilla (chamomile): Aromatic herb; receptacle hollow, conical from early stages.

M. matricarioides (syn. *M. discoidea*), common chamomile: Strongly aromatic herb; rayless heads lacking outer spreading white florets.

Why Are They Weeds?

The mayweeds and chamomiles are common in waste places and often in cultivated areas, though they cannot be regarded as serious crop weeds. In recent years *A. cotula* has become more frequent in pastures where

(Continued at bottom of page 323)

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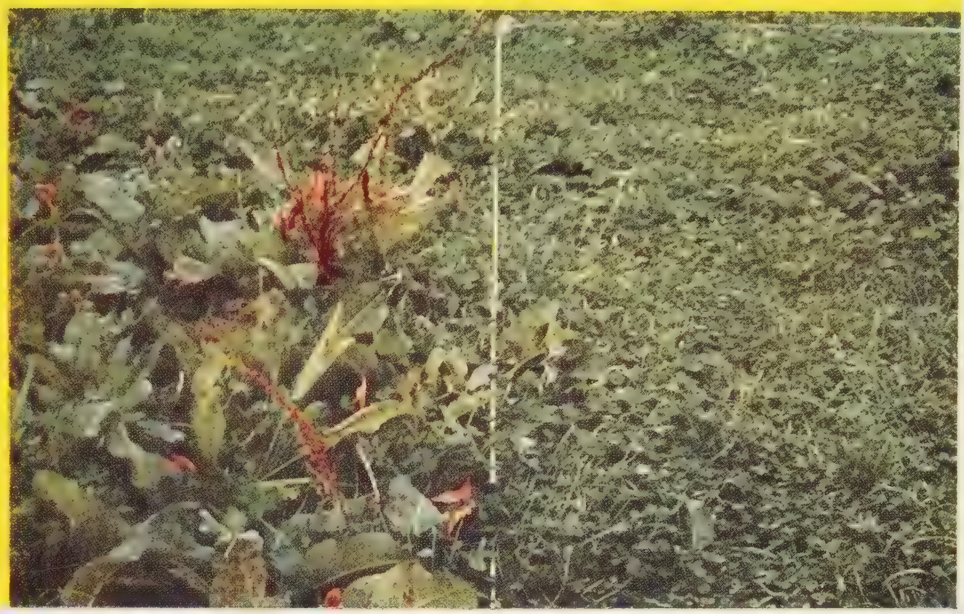
Control of Regrowth Docks in New Pasture with 2,4-DB

By P. F. GOULDING,
formerly Fields Instructor,
Department of Agriculture, Hamilton

AFTER the Department of Agriculture's Rukuhia Soil Research Station had shown that seedling docks could be readily controlled in new grass by an application of 1¼ lb of acid equivalent of 2,4-DB per acre, this practice was widely adopted by Waikato farmers. Though it proved most satisfactory for seedling control, heavier rates appeared necessary to control regrowth docks. Consequently a trial was laid to investigate ways of controlling regrowth docks by using heavier rates.



Unsprayed (control) area (left) and plot treated with 2,4-DB at 2¼ lb per acre (right).

AN autumn-sown pasture was treated five and a half weeks after sowing with 1½ lb, 2¼ lb, and 3 lb per acre. Two weeks after spraying there was no apparent damage to the clover plants and seedling docks had been eliminated, but regrowth docks, though severely affected, were persisting. By mid winter a vigorous pasture had been established and regrowth docks were prominent in the 1½ lb treatment only. The following summer it was evident that the 2¼ lb treatment had been effective in controlling all regrowth docks arising from small chips of roots cut by thorough discing or rotary hoeing. Mature dock regrowths were not killed.

Recommendations

Where regrowth docks are likely to be serious in newly sown pastures 2¼ lb of acid equivalent of 2,4-DB per acre should be applied about six weeks after the pasture is sown. Spraying should not be done until the clovers have formed two true leaves, by which time no bare ground should be evident. Twenty gallons of water is suggested as the carrier, and at the rate recommended the material will cost about £2 14s. per acre.

Mayweeds and Chamomiles

(Continued from page 321)

the soil is light, particularly in the Waikato and Bay of Plenty. It is not known yet whether this increase is due to poor pasture management or the ability of *A. cotula* to adapt itself to high fertility conditions and the grazing animal.

All species have been labelled as noxious weeds. *A. cotula* is the main problem, but owing to the difficulty of identification all species have been declared.

Control

In waste areas all species are most effectively controlled by MCPA/TBA (CP 18 : 15) at rates up to 2 gallons per acre. Salts of 2,3,6-TBA are also toxic at rates of up to 4 lb per acre. The spray should be applied as near as possible to the seedling stage, as resistance increases rapidly in all species as plants get bigger. Control in cereal crops is possible with MCPA/TBA (CP 18 : 15) at rates up to 4 lb per acre. In other crops control is not possible with post-emergence chemicals, as resistance to MCPA, 2,4-D, salts of dinoseb, etc., is high. Tolerance to pre-emergence chemicals is not fully known. Adequate control may be obtained in crops such as maize, grapes, asparagus, pears, and apples, where triazines may be employed as a pre-emergence application.

In established pastures control is not satisfactory, as MCPA/TBA (CP 18 : 15) is too toxic to clovers to warrant use even at the seedling stage. MCPA at about 3 to 4 lb of acid equivalent per acre will kill the weeds at the seedling stage, but this high rate of chemical is also very severe on clover.

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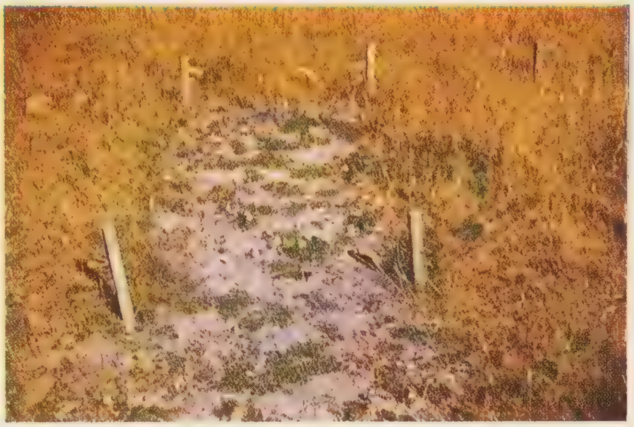
Soil Sterilant Aid to Clover Establishment Indicates Anti-nodulation Factors in Soils

By J. P. BEGGS,
Farm Advisory Officer, Department of Agriculture,
Blenheim

THE presence in the soil of inhibitory influences preventing the establishment of clover and the possibility of their being overcome by soil sterilant treatments have been indicated in trials in the Wither Hills at Blenheim, where other work has previously failed dismally to secure satisfactory clover establishment. The results seem to offer a new and fruitful field of soil fertility investigation that may shed light on the reasons for poor clover establishment on other soils.



Healthy clover etablishment on Wither silt loam after soil sterilisation with formalin (centre plot). On the plot at left burnt lime was applied at the rate of ½ ton per acre and at right thiram at 20 lb per acre.

RESEARCH in recent years has done much to facilitate the establishment and thrift of clover on country where previously it was difficult or impossible to secure good legume growth. However, much investigation is still required where treatment with molybdenum, sulphur, superphosphate, and lime and seed inoculation have done little toward securing satisfactory clover establishment. On the Wither Hills at Blenheim years of experimentation with all types of fertilisers and seed treatments, including many types of special seed pellets, have not been able to secure satisfactory clover establishment from oversowing. Earlier research had shown that the use of molybdenum and lime was helpful, but fell a long way short of providing the complete answer.

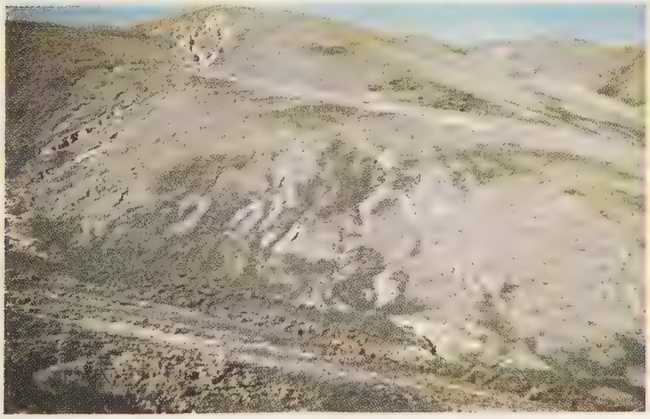
Use of Formalin

Recently, however, new light has been thrown on the problem through the discovery that soil sterilisation with formalin paves the way for successful clover establishment.

In a trial laid down in the late winter of 1959 on the Wither silt loam, numerous treatments, including a variety of fertilisers and seed pellets plus inoculation, failed to give any useful result except on a cross strip previously sterilised with formalin solution at the rate of 1 gallon of 20 per cent solution per square yard. Here a number of white clover plants established satisfactorily and continued normal growth, but not a single plant survived elsewhere on the trial area.

After this interesting finding more detailed soil sterilant treatments were included in another trial laid down the following autumn. The formalin treatment was retained and the following added: vapam, thiram (2 rates), Jeyes fluid, calomel, cosan, and burnt lime.

(Continued at foot of page 334)



Patchy clover growth denoting nodulation problem under 24 in. rainfall on Wither Hills, Blenheim.

Patchy clover growth denoting nodulation problem under 50 in. rainfall at Havelock.

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Studies in Farm Management

Left—Ridged swedes.
Right—This land is part of the Edendale Plain.

Diversification on Southland Farm

DURING the 1960 conference of the New Zealand Grassland Association in Southland members visited an Edendale farm managed by Mr J. Hillis, where they saw the principles of diversified farming put into practice. The farm not only carried pastures appealing to the eye, but apparently high productivity was accompanied by a minimum of stock troubles. In summing up the farm at the close of the inspection, the president of the Grassland Association, Dr P. D. Sears, succinctly described the farm as follows:

"This farm is, to me, unique in many respects. Not only is it one of the neatest farms I have ever seen in New Zealand or any other country, but it is extremely productive, has a relatively low labour force, and pasture, crop, and animal management have all been nicely fitted together.

"I consider Mr Hillis's diversification between sheep, cows, and crops has a good deal to do with it, in that his stocking and cropping sequence contributes to the relative lack of stock troubles on this farm. Young pastures, dominant in red and white clovers, are grazed by sheep; this builds up the pastures to a high-nitrogen and ryegrass-dominant stage; here the dairy cows take over and feed without the drawbacks of clover dominance and the taint-producing weeds of the new pasture.

"Later these grassy pastures are ploughed for crops of turnips, chou moellier, and wheat, with very high yields on the built-up, high soil fertility. After this the cycle starts again, with attractive efficiency at each stage."

The management of this farm is described here in more detail by W. FAITHFUL, Instructor in Agriculture, Department of Agriculture, Invercargill.

DURING the past 20 years there has been a very spectacular build-up in the sheep population in Southland. The number of breeding ewes has increased at the rate of between 80,000 and 100,000 a year during this period. Despite the almost universal predisposition to sheep farming, there are still some farms in Southland where a more diversified type of farming is carried out. An example of this is the 234-acre farm of Estate A. Hillis and Son on the Edendale Plain and about a mile from Edendale township. The property is under the efficient management of Mr J. Hillis, who has the assistance of one permanent employee.

THE farm is in one of the earliest farmed districts of the province, being part of 125,000 acres taken up by the Australia and New Zealand Land Company in the early days of Southland agriculture. (Some of the gates erected by this company are still in use on this farm.) The soil here is a completely free draining, moderately leached yellow-brown earth. Such free drainage, which is important in the management of this farm, is not usually an outstanding feature of Southland farm lands.

The farm is subdivided into 15 main paddocks (ranging from 12½ to 16 acres) plus the steading, which comprises the house and accommodation for the employee, woolshed and sheep yards, milking shed and yards, implement sheds, and a hay barn in a small adjacent paddock. All buildings, machinery, and other equipment on this farm are maintained in spotless condition.

Carrying Capacity and Production

The farm, of 234 acres, is carrying 35 Friesian cows and replacements (7 heifers, 7 calves, and 2 bulls). There are 1,050 Romney ewes and 29 Southdown flock rams; about 200 two-tooth ewes are bought in every year for flock replacements. There are also 65 stud Southdown ewes and usually about 35 ewe lambs and 35 ram lambs from these.

An additional activity is the fattening of Aberdeen Angus cattle. The number fattened each year varies according to the season, but is between 15 and 20. These cattle are bought in either in spring or autumn according to the season and disposed of at about 18 months of age as chiller beef or to butchers in either April or May.

The butterfat production of the herd is usually about 400 lb per cow (406 lb in the 1959-60 season) and the lambing percentage about 125 per cent. The wool clip averages 11 lb per sheep shorn.

Supplementary Feed Crops

Approximately 14 acres of lea is ploughed each year for swedes for supplementary winter feed. The crop rotation is: out of lea into swedes, followed by chou moellier the next year, and in the third year 10 acres

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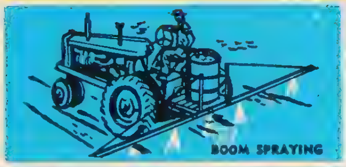

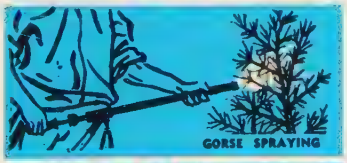

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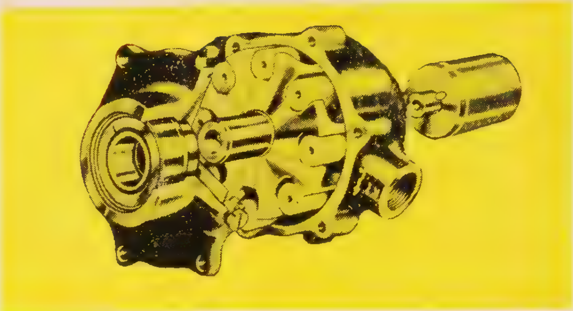

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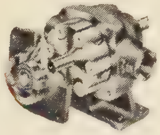

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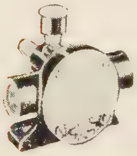

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of the area will be in wheat and 4 acres in oats; wheat and oats are grown regularly in the crop rotation. Both are spring sown (late August), the sowing rate for wheat being 3 bushels and of oats 4 bushels per acre.

The oats are grazed by the dairy herd in early October—day grazing only. They provide feed for about 14 days at a generally rather critical feed period, as it is usually just before the flush of pasture growth begins. After this grazing the oats are grown on, cut at the dough stage for hay, and baled for winter feed for the cattle. About 200 bales per acre is the usual yield.

The wheat yield is generally between 75 and 85 bushels per acre. The paddock is resown to pasture in autumn as soon as the wheat is harvested.

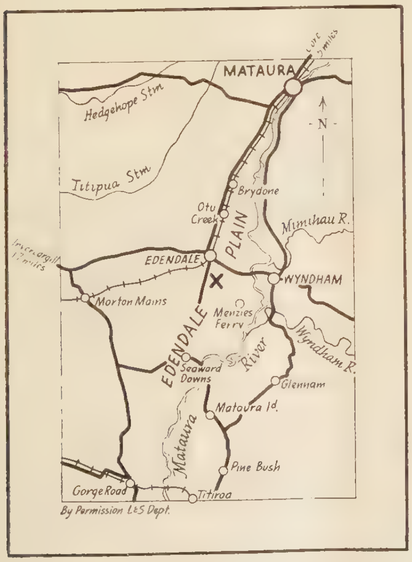
Under this system about 42 acres (one-sixth of the farm) is under the plough. Paddocks or part paddocks are closed for hay as they become available and generally 2,000 bales (including the oaten hay) are made each season.

Pastures and Topdressing

The pasture mixture sown is:

	Lb
Perennial ryegrass	20
Short-rotation ryegrass	10
Cocksfoot	7
Timothy	7
Cowgrass	2½
White clover	4
Suckling clover	½
	51

Carbonate of lime at 1 ton per acre is applied either before the grass seed mixture is sown or before the previous crop. The pH of this land is 6.5 to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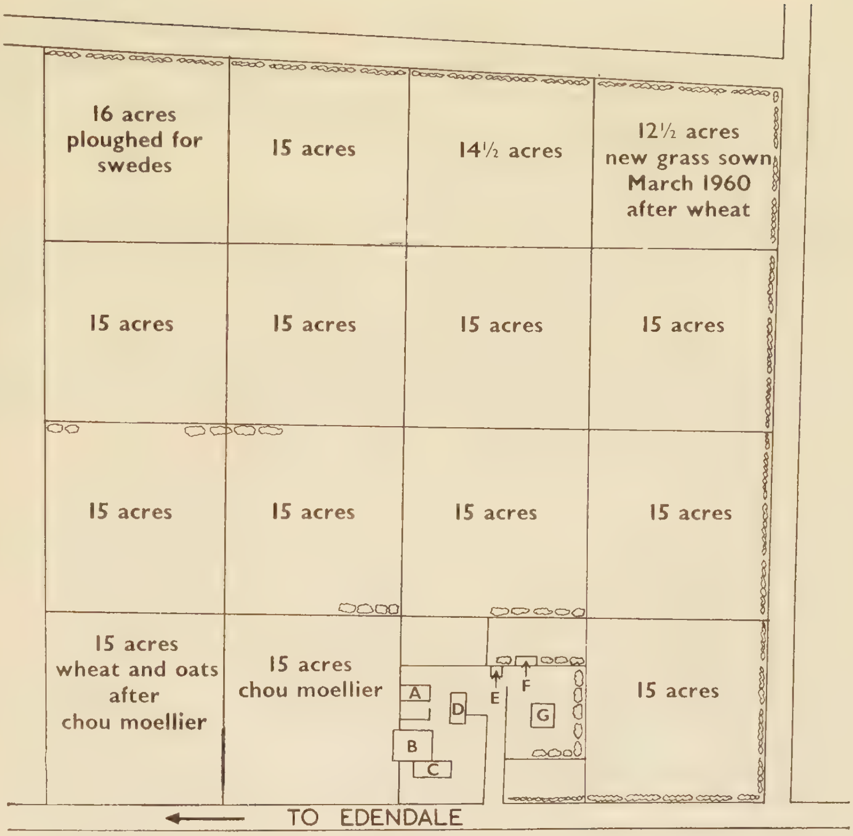
EDENDALE
X
WYNDHAM
Morton Mains
Menzies Ferry
River
Wyndham R.
EDENDALE
Seaward Downs
Glenham
Mataura Id.
Mataura
Pine Bush
Gorge Road
Titiroa
By Permission L&S Dept.

X Farm

MANAGEMENT OF SOUTHLAND FARM


16 acres ploughed for swedes
15 acres
14½ acres
12½ acres new grass sown March 1960 after wheat
15 acres
15 acres
15 acres
15 acres
15 acres
15 acres
15 acres
15 acres
15 acres wheat and oats after chou moellier
15 acres chou moellier
A
B
C
D
E
F
G
15 acres
TO EDENDALE

Farm plan. A—Milking shed. B—Sheep yards. C—Woolshed. D—Implement shed. E—Hut. F—Hay barn. G—House.

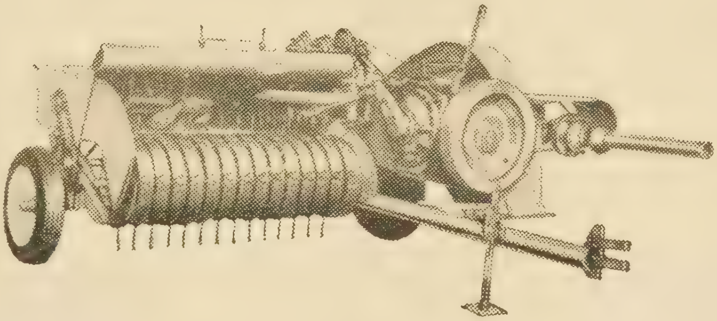
Part of the dairy herd.

IN ADDITION TO ENGINE FUNCTIONED LONG 48 AND B.L. 48 BALERS . . .

Bisley's
BETTER *Farm* MACHINERY

. . . Now Present

FURTHER ADDITIONS TO THE BISLEY RANGE OF BALERS



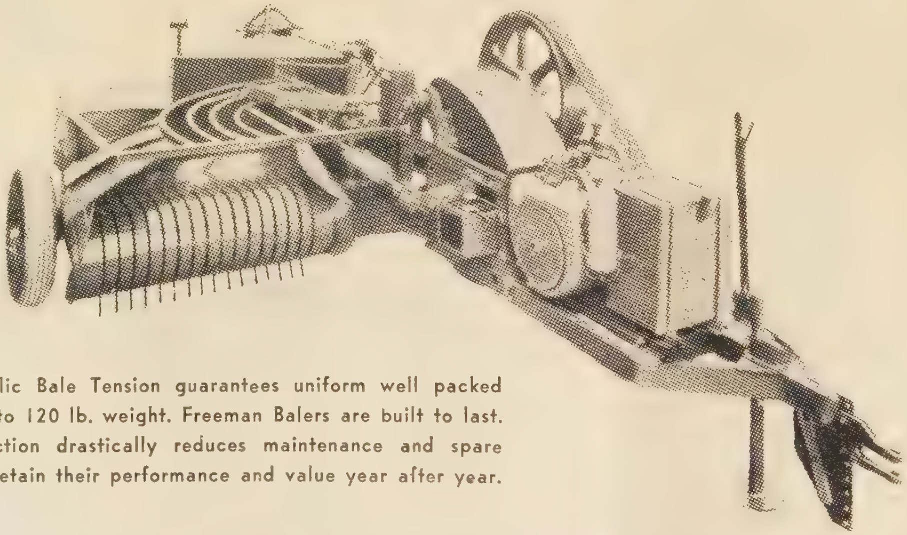
The P.T.O. Bisley Model 350 Automatic Pick-up Baler (made in U.S.A.). (Many parts are interchangable with the Long 48.) Capacity up to 10 tons per hour.

For the Contractor

THE BISLEY FREEMAN BALER (made in U.S.A.)

Most Durable High Production Baler in the World

Mr. D. M. Verity, Contractor, of Te Awamutu, advises, with his first FREEMAN BALER, which is still operating, he totalled 480,000 bales of hay over 9 seasons of operation. Maintenance amounted to £197 over the 9 seasons.



Automatic 4-way Hydraulic Bale Tension guarantees uniform well packed bales adjustable from 60 to 120 lb. weight. Freeman Balers are built to last. Rugged, durable construction drastically reduces maintenance and spare parts costs. Bisley Balers retain their performance and value year after year.

A. M. BISLEY & CO. LTD.

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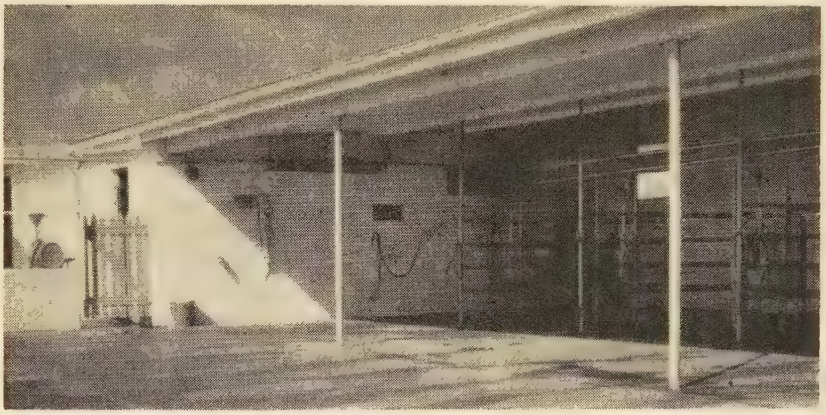
Above left—Shearing shed. Above right—Implement shed. At right—Milking shed.



6.8 and the whole farm has been given adequate lime in the past. Up to this season the pastures have been topdressed with a 2 : 1 mixture of superphosphate and potash at 2½ cwt per acre, part of the farm in spring and part in autumn; but in future a spring application (in August) will be made to ensure stimulation of growth. Spring is the critical time on these high carrying capacity farms.

Stock Management

Rams go out in April and lambing begins on 1 September. As the cows are coming in at the same time, this is a very busy period, particularly as there is only one employee. The ewe flock is off the swedes before lambing and is kept in two mobs; the unlambed ewes are shed off each day until the paddocks are set stocked at about 95 ewes to a 15-acre paddock. The Southdown stud ewes and the two-tooth ewes are lambed separately in small paddocks handy to the steading.

The dairy herd is grazed in two paddocks (total 30 acres) from the time they come in until the first lamb draft; at this time all the lambs are weaned and shearing is done as soon as possible afterward. Until two years ago the first draft was usually sent off at the end of January, when between 80 and 90 per cent of the lambs went away, but with the attractive schedule for early lambs the draft has been put forward to mid December, when about 50 per cent are selected.

After the weaning of the lambs the ewes are closed up into two mobs and rotationally graze four paddocks. With this system the ewes are kept in good condition until tupping. They are not starved to take the condition off them. This system is extremely satisfactory for the ewes, and the concentration of sheep helps to maintain fertility on the paddocks chosen, usually the older pastures.

The stimulation to the pasture is usually such that these paddocks are also saved for the early feeding of the ewes just before lambing. Another advantage is that by keeping the ewes in good condition any break in the wool at this stage is avoided.

Winter Feed

Winter feeding is usually begun about mid June, when the ewes go on to the chou moellier, which is fed off in breaks. The ewes have free access to the chou moellier break from an adjoining paddock; this is found a much more satisfactory method than putting them on and off at intervals. By having free access, they do not tend to gorge and it is less wasteful than is the feeding by the controlled "on and off" method.

The dairy herd is kept on the **oldest pasture** (usually about 15 acres) from mid June to mid July. This is a specially saved paddock, which is generally closed about the middle of March and is fed off in breaks; hay is also fed out to them during this period. When the saved pasture is finished the cattle clean up what remains of the chou moellier after the ewes have finished on this crop and been started on the swedes. The ewes are generally on the swedes for about a month (August).

Swede and Chou Moellier Crops

The old pasture of 15 acres used for the dairy herd during July is the paddock intended for swedes. As full use is made of this as a pasture grazing area, it is usually not ploughed up until October. This late ploughing is quite satisfactory on this land; the lea is not a tough old turf which requires mellowing by time and weather. The land is quite friable and can be worked down to a good tilth in time for ridging in of swedes early in December.

Swedes are usually given three scufflings with the back shoe removed so that the soil is drawn away from the bulbs. (Scuffling of the chou moellier is done with the back shoe **on** so that the soil is drawn up to the plants.)

Two-thirds of the paddock is in the Wilhemsburger variety and one-third in Crimson King, the latter being fed

SHEEP FARMERS!

a message from Geigy about

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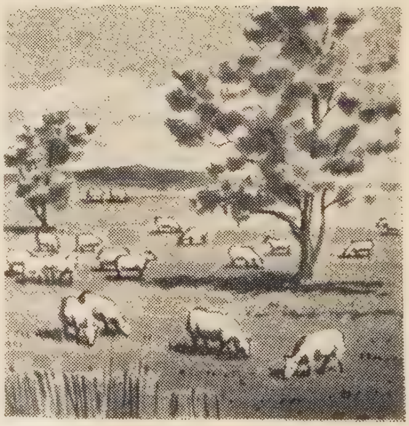
Little's
McDougall's
Quibell's
T.V.L.

Geigy licensees are required to conform with high technical and commercial specifications. The manufacturers and distributors of the above products have been granted licences by Geigy because they are able to meet these requirements. Thus New Zealand sheep farmers are assured of diazinon products which fully conform with the high standard and reputation already established for Geigy diazinon products throughout the world. Because diazinon formulations are manufactured to Geigy's most stringent specifications they may be used with complete confidence.
Geigy Proprietary diazinon products are distributed throughout New Zealand by Agricultural Services (N.Z.) Ltd., a subsidiary of Ivon Watkins Limited.



Geigy **GEIGY (AUSTRALASIA) PTY. LIMITED**

GP.1

Bulk topdressing and liming.

off first. For swedes 3½ cwt per acre of reverted or serpentine superphosphate is used, borated fertiliser being used in the front box of the ridger.

When chou moellier is ridged a mixture of potassic serpentine superphosphate (3 parts) and ammonium nitrate-lime mixture (1 part) at 3½ cwt per acre is sown down the front spouts and ½ cwt of reverted superphosphate with the seed. Usually headlands of the chou moellier paddocks are not ridged in this crop, but after scuffling, rape and Italian ryegrass are drilled into them on the flat.

This surround is grazed off by the stud ram hoggets from about early April until the end of May. The hoggets tend to keep to the rape and grass before attempting to take any chou moellier; they do well on this feed. An additional advantage of this method of sowing is that it facilitates the fencing off of the breaks and general management.

Bought-in Lambs

After the milk lambs have been drafted the weaned lambs are put on the pastures, generally those where the lambs have done best. The tail enders are put on to swede tops, generally about mid April, and drenched with calciferol.

Usually some wether lambs (from 150 to 200) are bought in in late February and most of them are also fattened on pasture. Any tail enders are finished on swede tops. Generally all lambs are disposed of in three drafts.

Late Winter and Early Spring

From about mid July the ewes are given access to saved pastures (about two hours per day) and are fed hay on the run-off paddock. They are generally on the first break of swedes in the first week of August. The dairy herd is on the swedes from about mid August up to and during calving. During this period they are given plenty of hay, any additional attention at this time being amply justified in results during the milking season.

The 65 stud Southdown ewes are usually accommodated in small paddocks adjacent to the steading, but may also graze with the dairy herd.

The only feed not produced on the farm is a small quantity of concentrates for the stud flock. These sheep are not given any swedes, but are fed concentrates during winter.

Diversification in Farming

There has been a steady increase in the sheep population of Southland and the cumulative figures are extremely spectacular. This trend in specialised farming, or as one overseas visitor has described it "luxury farming", may not be considered to be in the best interests of Southland agriculture, either from an agricultural or economic point of view. The old words of caution about the danger of having "all one's eggs in one basket" could apply.

Diversification of farming has much to recommend it and though the type of management described in this article could not be adopted throughout Southland, it is an extremely good example of what might be done to take advantage of conditions on the easier country, where soil fertility has been steadily built up during many years of sheep farming. On much of this land lamb fattening has become a problem, and a change in farm practice could be of considerable benefit to both farms and farmers.

◆

Meteorological Records for August

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	51.5	+0.5	65.4	34.5	10.33	18	+4.1	3.29	23	155
Auckland	160	51.7	—0.5	61.7	39.0	7.26	13	+3.0	3.50	23	177
Tauranga	12	49.0	—0.7	60.6	33.8	4.40	10	—0.4	1.63	24	164
Ruakura	131	47.6	—0.9	62.6	28.8	2.91	11	—1.2	1.11	23	174
Whakarewarewa ..	1,006	45.8	+0.3	61.0	28.2	3.56	7	—1.5	1.34	24	151
Gisborne	14	48.6	—0.6	63.0	32.9	6.11	23	+2.2	1.53	31	115
New Plymouth ..	160	49.6	+0.0	63.1	34.1	1.86	5	—4.0	1.29	4	180
Karioi	2,125	40.6	—1.4	58.5	24.5	7.00	11	+3.0	1.84	5	
Napier	5	48.6	—0.5	60.1	33.3	6.30	17	+3.5	1.91	31	111
Wanganui	72	48.0	—1.1	68.9	31.1	4.51	10	+1.5	1.86	4	153
Palmerston North ..	110	46.8	—0.9	65.7	31.4	3.83	14	+0.3	1.76	6	110
Waingawa	340	45.4	—0.5	64.5	29.0	7.28	18	+3.1	2.03	6	103
Wellington	415	47.0	—0.6	60.9	36.9	3.58	16	—1.7	1.05	4	125
Nelson airfield ..	5	44.9	—0.1	60.4	27.4	1.91	5	—1.7	1.02	4	210
Blenheim	14	45.8	—0.5	65.0	29.2	0.78	6	—1.7	0.41	4	205
Hanmer Forest ..	1,270	39.8	—1.6	62.8	21.8	6.24	13	+2.2	2.35	4	151
Hokitika South ..	15	45.0	+0.3	63.0	28.8	4.83	8	—4.5	1.77	23	210
Christchurch ..	22	44.6	+0.3	72.3	29.2	3.10	13	+0.8	1.18	4	157
Ashburton	323	44.0	+0.3	72.2	24.3	4.24	8	+1.9	1.46	4	165
Timaru	56	44.2	+0.4	67.3	28.8	2.01	9	+0.6	0.51	3	175
Alexandra	520	40.2	—1.2	61.5	22.8	0.34	6	—0.3	0.21	3	173
Taieri	80	42.2	—1.5	62.1	24.4	1.96	11	+0.1	0.63	6	114
Invercargill airfield ..	0	42.8	—0.2	62.2	27.4	2.26	13	—0.7	0.50	3	144
Chatham Island ..	150	45.8	—0.4	54.2	37.0	3.76	18	+0.6	0.88	9	84

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of February 1962:

NORTH ISLAND

October

13 and 14 October—Poverty Bay A. and P. at Gisborne.

17, 18, and 19 October—Hawke's Bay A. and P. at Hastings.

26, 27, and 28 October—Waikato A. and P. at Hamilton.

27 and 28 October—Wairarapa and East Coast A. and P. at Carterton.

November

1 November—Cambridge A. and P. at Cambridge.

*3 and 4 November—Manawatu and West Coast A. and P. at Palmerston North.

4 November—Tokoroa A. and P. at Tokoroa.

8 November—Hauraki A. and P. at Paeroa.

10 and 11 November—Whangarei A. and P. at Whangarei.

*10 and 11 November—Wanganui A. and P. at Wanganui.

11 November—Central Hawke's Bay A. and P. at Waipukurau.

11 November—Rotorua A. and P. at Rotorua.

11 November—Clevedon A. and P. at Clevedon.

15 November—Thames Valley A., P., and H. at Te Aroha.

*17 and 18 November—Egmont A. and P. at Hawera.

18 November—Waihi A. and P. at Waihi.

18 November—Bay of Islands P. and I. at Waimate North.

*23, 24, and 25 November—Auckland A. and P. at Epsom, Auckland (Royal Show).

24 and 25 November—Stratford A. and P. at Stratford.

29 November—Plains A. and P. at Ngatea.

December

1 and 2 December—Taranaki A. and P. at New Plymouth.

1 and 2 December—Kaikohe A., P., and H. at Kaikohe.

*2 December—Helensville A. and P. at Helensville.

*9 December—Whangaroa A. and P. at Kaeo.

January

1 January—Nuhaka A. and P. at Nuhaka.

13 January—Waipu A. and P. at Waipu.

19 and 20 January—Wairoa County A. and P. at Wairoa.

*19 and 20 January—Feilding I., A., and P. at Feilding.

26 and 27 January—Horowhenua A. and P. at Levin.

*27 January—North Kaipara A. and P. at Paparoa.

31 January—Marton District A. and P. at Marton.

February

2 and 3 February—Rodney A. and P. at Warkworth.

3 February—Rangitikei A. and P. at Taihape.

*3 February—Katikati A. and P. at Katikati.

3 February—Woodville A. and P. at Woodville.

6 and 7 February—Dannevirke District A. and P. at Dannevirke.

*10 February—Pahiatua A. and P. at Pahiatua.

9 and 10 February—Taumarunui District A. and P. at Taumarunui.

10 February—Hukerenui A. and P. at Hukerenui.

14 February—Te Awamutu A., P., and H. at Te Awamutu.

16 and 17 February—Ohura A., P., H., and I. at Nihoniho.

16 and 17 February—Franklin A. and P. at Pukekohe.

16 and 17 February—Masterton A. and P. at Masterton (75th Jubilee)

*17 February—Waiapu P. and I. at Ruatoria.

17 February—Opotiki A. and P. at Opotiki.

19 February—Northern Wairoa A. and P. at Mititai.

20 February—Otorohanga A. and P. at Otorohanga.

23 and 24 February—Te Kuiti A. and P. at Te Kuiti.

23 and 24 February—Wellington and Hutt Valley A. and P. at Trentham.

*23 and 24 February—Mangonui County A. and P. at Kaitaia (75th Jubilee).

24 February—Waimarino A. and P. at Raetihi.

24 February—Te Puke A. and P. at Te Puke.

24 February—Putaruru District A. and P. at Putaruru.

SOUTH ISLAND

October

*14 October—Ellesmere A. and P. at Leeston.

21 October—Northern A. and P. at Rangiora.

28 October—Amberley A. and P. at Amberley.

28 October—Motueka A. and P. at Motueka.

*28 October—Ashburton A. and P. at Ashburton.

November

*3 and 4 November—Marlborough A. and P. at Blenheim.

*8, 9, and 10 November—Canterbury A. and P. at Christchurch.

11 November—Tokomairiro A. and P. at Milton.

15 November—North Otago A. and P. at Oamaru.

*17 and 18 November—Nelson A. and P. at Nelson.

18 November—Waimate A. and P. at Waimate.

18 November—West Otago A. and P. at Kelso.

18 November—Courtenay A. and P. at Kirwee.

18 November—Taieri A. and P. at Outram.

22 November—Winton A. and P. at Winton.

24 and 25 November—Timaru A. and P. at Timaru.

*25 November—South Otago A. and P. at Balclutha.

28 and 29 November—Gore A. and P. at Gore.

December

2 December—Wyndham A. and P. at Wyndham.

2 December—Otago Peninsula A. and P. at Portobello.

*5 and 6 December—Southland A. and P. at Invercargill.

January

13 January—Wallace A. and P. at Otautau.

20 January—Waiau A. and P. at Tuatapere.

*27 January—Peninsula Horse and A. and P. at Duvauchelle.

27 January—Palmerston and Waihemo A. and P. at Palmerston.

30 and 31 January—Otago A. and P. (South Island Championships) at Dunedin.

February

3 February—Golden Bay A. and P. at Takaka.

3 February—Banks Peninsula A. and P. at Little River.

17 February—Murchison A. and P. at Murchison.

17 February—Maniototo A. and P. at Ranfurly.

23 February—Central Otago A. and P. at Omakau.

24 February—Buller A. and P. at Westport.

*24 February—Kaikoura A. and P. at Kaikoura.

* The Department of Agriculture exhibit will be staged at this show.

Anti-nodulation Factors in Soils

(Continued from page 325)

Though a few clover plants established under all these treatments, the formalin plots (three replicates) were outstanding, presenting an 80 to 90 per cent cover of vigorous flowering clover after 12 months. The vapam plots were also good, but not nearly up to the standard of the formalin treatment. Clover density and vigour appeared to be directly related to the number and vigour of root nodules present. Nodulation and clover vigour were best under the formalin treatment.

This clover establishment problem is not confined to dry eroded soils such as the Wither silt loam in Marlborough, where the rainfall is about 24 in. annually. It is at its worst on this soil type, but occurs also on other soils under an annual rainfall of up to 60 in. No doubt there is the same type of problem in other parts of the country.

"Sun-bleached" Soils

It relates predominantly to oversowing, for when the Wither silt loam is cultivated and limed there is no difficulty in establishing clovers. The problem appears to be largely confined to what might be termed "sun-bleached" soils (sunny country that has been clear of scrub, fern, or other shade-producing cover for some years). For example, it may be severe on a particular soil type under danthonia and browntop but absent from the same soil type, through the fence, under fern. It appears to be at its worst on clear, sunny danthonia country.

This work, though having no practical application on hill country at present, is of interest in that it places emphasis on what appears to be a most important field of soil fertility, the existence of inhibitory micro-fauna or micro-flora or other factors in certain soils.

Such inhibitory influences could explain not only the complete failure of clover to establish on some soils, but also many of the indifferent results at present obtained on a wide variety of other soil types. It certainly indicates a need for further research directed toward specific elucidation of the problem and toward securing an economic treatment for overcoming these inhibitory influences in the soil.

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Cotting in Wool and Ways of Reducing It

FLEECES which are cotted (matted) are usually lighter and worth less than free, open fleeces. Investigations made at the Department of Agriculture's Whatawhata Hill Country Research Station into this wool fault were described at this year's Ruakura Farmers' Conference by J. P. JOYCE, Scientific Officer, who suggested that the best means of reducing cotting in the flocks studied would be improvement of the overall level of nutrition, especially better winter and early spring feeding. Culling of cotted two-tooths and twice yearly shearing could also be considered. An adaptation of Mr Joyce's paper follows.

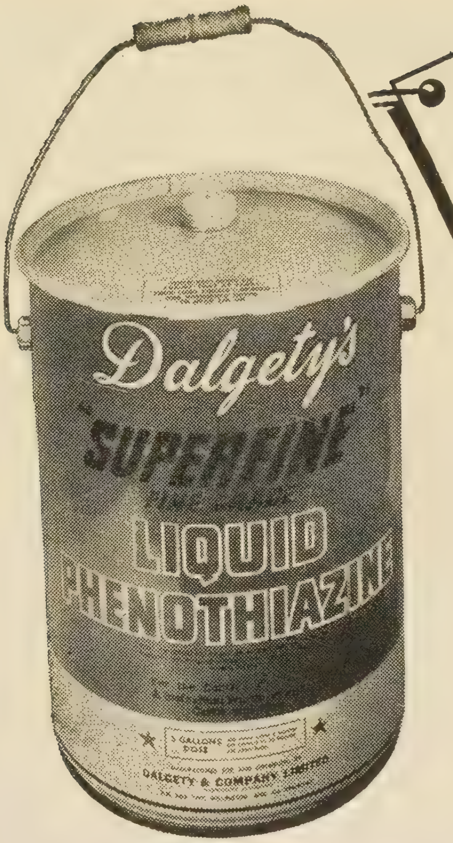
IN all fleeces there is some evidence of entanglement of the wool fibres. However, the extent to which this entanglement takes place varies tremendously, and in the commercial world only fleeces in which the staples cannot be torn apart easily are deemed to be cotted. In the manufacturing processes such fleeces must be teased apart, involving a higher cost and some deterioration in wool value due to fibre damage.

Cause of Cotting

In a cotted fleece the formation of the matted area is due primarily to the shedding from their follicles of a proportion of the wool fibres. If all or nearly all the fibres are shed, the whole fleece may be shed. If, however, only a proportion is shed, the fleece is retained and the degree of cotting varies.

Before it is shed the fibre becomes considerably reduced in diameter and, after breaking free, has a thin end. This end portion is extremely twisted and intertwines with the ends of other similar shed fibres and the tips of the newly growing fibres, so producing the beginning of the mat. The matted area is often particularly rich in wool grease. The cot tends to impede the normal flow of grease toward the fibre tips, allowing a build up in and below the mat.

The clean scoured yield of cots can be greater than that of free wool. Though the area of wool below the mat can be relatively rich in wool grease, the staple above the mat is usually more weathered and consequently higher yielding. Cotting, it has been shown, occurs at the time of the year



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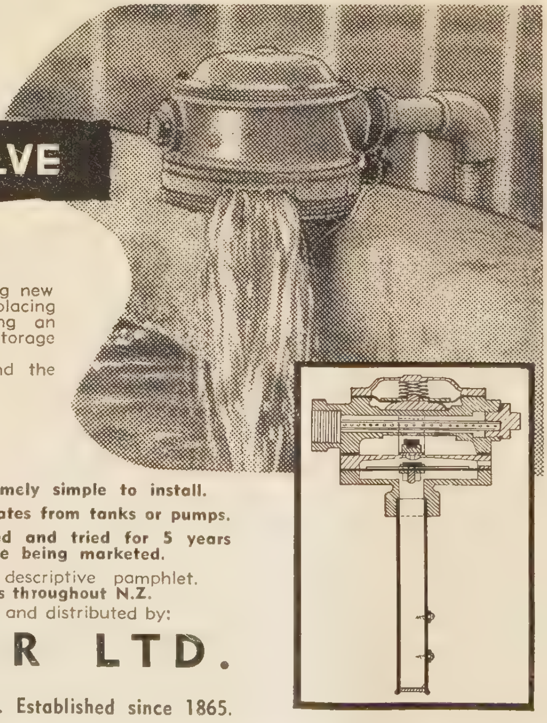

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corresponding to the shedding of the inner coat in animals where this is the rule.

It is clear that the presence of free fibre ends, being interwoven mechanically, is a fundamental factor in cotting. Since the fibre population on the skin of the sheep is large (9,000 to 12,000 per square inch in the Romney and 25,000 to 40,000 in the Merino), the shedding of even a moderate percentage of the fibres provides very large numbers of loose ends in the fleece. N. Galpin's work shows that the Romney sheep tends normally to shed up to 13 per cent of the fibres in winter.

The forces that cause the fibres to entangle and so form a cot are the subject of some conjecture. It appears, however, that the presence of surface scales on the fibre and variations in the moisture content of the fleece, causing twisting of the fibres and general mechanical movements of fibres in the fleeces, help toward the formation of the cot.

Variation in Cotting over Body

Fleeces are seldom cotted completely over the body. Most cots are seen on the lower side of the body (lower legs, belly, and sides) where mechanical movement and abrasion are greatest. The back and neck are normally the last to cot.

From what is known of wool growth gradients over the body it appears that cotting is most frequent on areas with the lowest rate of wool growth. Wool growth is slowest on the lower regions and fastest on the back and neck. These regions of slow growth also have greater fibre variability, and under these conditions fibre shedding and wool break and consequent matting could be expected to be greatest.

Effect on Value

Prices for cots tend to be lower than those for free, open wool, but the difference may vary from year to year. Prices over five years from a March sale show that cotted fleece wool of fair to good colour, free of seed, and unskirted or insufficiently skirted generally brings 2d. to 3d. per pound less than free, full length, but otherwise similar, fleece wool.

Cots may sometimes, however, fetch just as good a price as free, open wool and occasionally more. High prices for cots are due mainly to three reasons:

1. An increased demand for cots by certain sections of the trade; this may temporarily inflate the value of this type of wool.

2. Cots tend to be higher yielding than free, open fleeces; and higher yields normally mean higher prices.

3. Cotted fleeces tend to be higher in count than their free, open counterparts, because cotting is due to a reduction in fibre growth rate and consequent fining of the fibres. This fineness can result in a higher price for cotted wool.

In the processing of cotted fleeces the wool must be torn apart on spiked rollers before normal manufacturing. This physical separation causes a large proportion of broken fibres and this effect and the cost of the operation seem to be the main reason for the lower price usually received for cotted wool.

Factors Affecting Cotting

A large number of factors can affect fibre growth and consequently wool cotting.

Season

The season is one of the most important factors influencing the percentage of the flock with cotted fleeces. The percentage of the Whatawhata Hill Country Research Station flock that has been cotted during the last eight years has varied from 63.2 in 1953 to 24.4 in 1958, with an average of 42.2. Included were fleeces which, though classified at the Hill Station as slightly cotted, would be deemed by the wool trade to be only webby (fibres slightly entangled).

Age

There is a marked tendency for the percentage of cotting to increase with age. The chief effect of age appears to be increased number of cots rather than severity of cotting. In Hill Station flocks the percentage of cots averaged over three years was 36.2 per cent in two-tooths, 31 per cent in four-tooths, 36.7 per cent in six-tooths, 41 per cent in four-year-olds, 46.3 per cent in five-year-olds, and 51.4 per cent in six-year-olds.

Fleeces of two-tooths at the Hill Station tend to be more cotted than those of four-tooths. Reasons for this may be:

(a) Four-tooth and older sheep were carrying 12 months' wool grown from December to December, but two-tooths (shorn as hoggets the previous October or November and then as two-tooths in December) were carrying 13 to 14 months' wool. (It will be shown later that the longer the time is between shearings, the greater the incidence of cotting will be.)

(b) Two-tooths, still growing and consequently immature, are more susceptible to stress, and susceptibility to stress can mean susceptibilty to cotting.

However, age groups other than two-tooths showed an increase in cotting from 31 per cent as four-tooths to 51.4 per cent as six-year-olds.

Breed

Cotting does not appear to be peculiar to any breed of sheep. It has been reported in Romneys, Corriedales, Merinos, and crossbreds. At the Hill Station we have compared only the purebred Romney and the Border Leicester-Romney cross, with the following results:

PER CENT OF COTTED FLEECES

	Romney	B.L. x R.
1957	25.3	44.0
1958	17.4	29.7
1959	18.0	20.8
1960	39.9	43.9
Average	25.2	34.6

On a year-to-year basis the Romney was always superior in the number of free fleeces. The Border Leicester-cross ewes have an average lambing percentage of 109 compared with 80 for the Romneys; and the wool of the Border Leicester-cross sheep has a lower Bradford count (is coarser) than Romney wool. The importance of this will be explained later.

Nutrition

This year we are attempting to isolate the effect of a low plane of nutrition on cotting and also to determine the time of the year when a temporary low plane of nutrition is most effective in producing a cotted fleece. Some insight into the overall effect of nutrition on cotting may be obtained from experiments conducted by I. J. Inkster at Whatawhata in which two flocks of genetically similar Romney sheep are grazed, one on a consistently low plane of nutrition and the other on a consistently high plane. The percentage of cots in the seven years was as follows:

	High plane flocks per cent	Low plane flocks per cent
1954	23.2	26.0
1955	24.7	61.7
1956	29.6	75.0
1957	20.7	57.6
1958	25.5	59.0
1959	17.7	42.6
1960	28.6	45.9
Average	24.3	51.6

The fact that low-plane nutrition more than doubled the incidence of cotting emphasises the importance of nutrition in affecting cot formation.

Fleece Fineness

There appears to be marked association between cotting and the fineness of the fleece. An analysis of 4,000 to 5,000 fleeces at the Hill Station showed the following relationship between Bradford count and cotting:

Bradford count	46s	46/48s	48s	48/50s	50s	50/52s	52s	54s
Per cent cots	64.5	47.1	38.9	29.8	24.2	24.0	11.1	0

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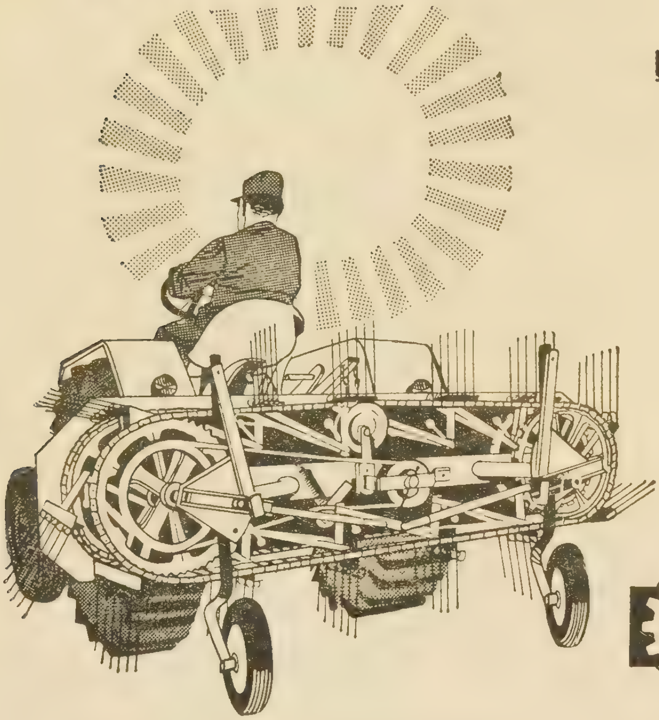

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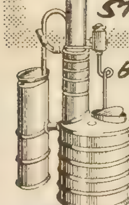

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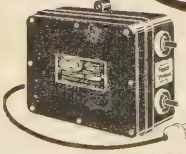

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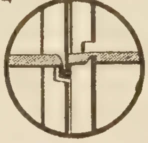

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The lower the count or the coarser the fleece is, the greater is the incidence of cots. Finer fleeces tend to be freer or even completely free of cots.

Interval Since Last Shearing

The incidence of cotting also appears to be affected by the length of wool carried by the sheep or the time since it was last shorn.

An experiment by G. C. Everitt of Ruakura illustrates this point. A flock of ewes was randomised after shearing in November 1958 into four groups, each being shorn at a different time in the following year.

Group 1 (7½ months between shearings) had no cots, Group 2 (10½ months) had 3.1 per cent of cots, Group 3 (11¾ months) had 8.5 per cent, and Group 4 (12¾ months) had 10.6 per cent.

Obviously the more wool that is carried the greater is the susceptibility to cotting. This leads on to consideration of the effect of twice yearly shearing on cotting.

Two years' results on shearing twice yearly at the Hill Station, once on a mixed age flock and once on a two-tooth flock only, indicated that the practice entirely eliminated cotting.

However, it is apparent in wool stores that some winter-grown second-shear wool has a high proportion of cots. The effects of twice yearly shearing on cotting may vary between areas, depending possibly on environment, particularly management.

Cotting and Fleece Weight

On the hypothesis that cotting is due to total or partial depression of fibre growth rate, the weights of cotted fleeces could be expected to average less than those of free, open ones.

Information collected at Whatawhata over five seasons showed that on average free, open fleeces were about 0.3 lb heavier than cotted fleeces, the difference in various years ranging from 0.2 lb to 0.6 lb.

Working on the finding that cotting occurs to a greater extent in coarser than in finer fleeces, the loss of wool is really greater than 0.3 lb per cotted fleece. Coarse wool has a higher expected fleece weight than finer wool, approximately 0.3 lb per whole count interval for Romney and crossbred. Cots, being coarser, should be heavier. When the weights of cotted fleeces are corrected for fineness these fleeces are at least 0.5 to 0.6 lb lighter than free fleeces.

Cotting and Reproductive Performance

Cotting is due partly to a break in wool fibres causing a proportion to become free within the fleece. Of the many stresses that can act on the fleeces to cause fibre break, the level of nutrition (already discussed) and the reproductive cycle are the two most important. Some sort of picture of the effect of the reproductive performance on cotting is given by the lambing of some Hill Station flocks over the last four years. In these seasons the lambing percentage of ewes with cotted fleeces ranged from 100.5 per cent to 108.4 per cent and for ewes with free fleeces from 89.5 per cent to 92.5 per cent. The overall average for the cotting ewes was 13.1 per cent higher. The combined stresses of gestation and lactation appear to have produced a higher incidence of cotting. This was shown in two experiments in 1959 and 1960.

In each year six- and seven-year-old ewes were selected on the basis of their past history of cotting and lambing. There were two groups. Group 1 (ewes which had produced a severely cotted fleece and a lamb every year of their productive life) was called the cotting group. Group 2 (similar except that each year the ewes had produced a free, open fleece) was called the free group. Both groups had been grazed together all their lives.

In 1959 each group was randomised into two sub-groups. One of these was tupped and allowed to carry lambs through to weaning; the other was kept empty.

In 1960 the same experiment was repeated except that an extra group included ewes that were put to the ram but whose lamb was removed at birth ("pregnant only" sub-group). Results were as follows:

PER CENT COTTING

	1959	1960
Cotting type		
Empty	33.3	45.0
Pregnant only ..	—	82.0
Wet	100.0	100.0
Free type		
Empty	0.0	0.0
Pregnant only ..	—	0.0
Wet	33.3	27.0

These experiments showed that both pregnancy and lactation had a profound effect on cotting in the cotting type sheep, but in the free type their combined effect appeared necessary to produce any degree of cotting.

Effect of Cotting in Two-tooth on Future Production

From analysis of shearing data at the Hill Station, two-tooths were divided up into one of two groups. Group 1 was composed of sheep which produced cotted fleeces as two-tooths and Group 2 of two-tooths having free, open fleeces. The lifetime performance of these animals for cotting, fleece weight, and number of lambs reared was traced from the time they were four-tooths until their sixth year was completed. The two-tooth data could not be included, as it was the original basis for the selection of the two groups.

Ewes cotted as two-tooths showed a tendency to cot that was approximately twice that of sheep free as two-tooths. Sheep cotted as two-tooths also produced on an average 0.2 lb less wool at each shearing, but during their lifetime they had 0.2 more lambs. This is what would be expected from results discussed earlier in this article which showed that cotted sheep produced less wool but more lambs. The tendency of a two-tooth to cot indicates a tendency for it to cot throughout its lifetime.

Conclusions

The following conclusions can be drawn:

1. Cotted fleeces tend to be lower in weight and price.
2. The incidence of cotting in a flock is affected by season, breed, age composition, reproductive performance, and management (particularly nutrition and shearing interval).

Methods of reducing the incidence of cotting in a flock present problems.

As already indicated the best method for reducing cotting in the flocks studied would be by increasing the overall level of nutrition, especially during winter and early spring. Where this method is practicable it should be adopted. However, under hill country conditions, where continuous intensive grazing is necessary for control of pastures, weeds, and secondary growth, increasing the level of nutrition by, for example, reducing the stock numbers is not necessarily the best solution.

Some method of culling cotted two-tooths under these conditions may be considered. Culling of these animals will reduce the percentage cotted in the flock in future and raise the average fleece weight slightly, though on our data the future lambing percentage may be reduced by up to 5 per cent. Moreover, the two-tooths producing lambs will be penalised, because two-tooths producing a full, open fleece had a lambing percentage on the Hill Station of 68.5 per cent, while the cotted two-tooths' lambing percentage was 80.7 per cent.

Shearing twice yearly may be beneficial. Wool grown in summer and autumn will normally be completely free of cots, and winter-grown second-shear wool will at least have a lower percentage of cots. At least half of the wool from sheep shorn twice yearly will be free of cots. However, the other attendant benefits and disadvantages of twice yearly shearing should be considered.

N.Z. Dairy Production and Marketing Board

AMALGAMATION OF DAIRY BOARD AND MARKETING COMMISSION

THE New Zealand Dairy Board, which was established in 1924, and the New Zealand Dairy Products Marketing Commission, set up in 1947, have now been amalgamated as the New Zealand Dairy Production and Marketing Board (under the Dairy Production and Marketing Board Act 1961). Mr A. Linton (formerly chairman of the Dairy Board) has been elected chairman of the new body and Mr R. A. Candy (formerly chairman of the Dairy Products Marketing Commission) deputy-chairman.

The New Zealand Dairy Production and Marketing Board consists of two Government appointees and 11 industry representatives. They are:

Government appointees: Mr H. A. Foy, Director, Dairy Division, Department of Agriculture, and Mr H. M. Caselberg.

Industry representatives: Messrs E. R. Bird and D. A. Finlayson (northern ward); M. Leeson (South Auckland ward); R. A. Candy, R. W. Greenough, and F. L. Onion (New Zealand Co-operative Dairy Company); A. L. Friis (eastern ward); J. S. Hickey and L. D. Hickford (Taranaki ward); A. Linton (Wellington ward); and J. M. Archibald (southern ward).

[*National Publicity*

The Minister of Agriculture, Mr Hayman (middle), who opened the first meeting of the New Zealand Dairy Production and Marketing Board on 4 September. With him are the board's chairman, Mr A. Linton (left), and deputy-chairman, Mr R. A. Candy (right).

Veterinary School to be at Massey College

EARLY START ON ESTABLISHMENT

THE Government's selection of Massey Agricultural College, Palmerston North, as the site for a New Zealand veterinary school was announced early in September by the Prime Minister, Mr Holyoake, who said an early start would be made on establishing the school.

AMONG the recommendations of a special committee on veterinary education set up by the University of New Zealand in 1954 was that New Zealand's interests would be best served by establishing veterinary training facilities here if and when possible.

In 1956 a Cabinet caucus committee considered that continuation of training of New Zealand veterinary students in Australian veterinary colleges would serve New Zealand's needs meantime, but that expanding needs for veterinary service in this country would make a New Zealand school necessary eventually.

"The Parry Committee" on New Zealand Universities recommended in 1959 that if a veterinary school were established, its site should be nominated by the University Grants Committee, which later adopted a special senate subcommittee's recommendation of Massey Agricultural College.

Cabinet in 1960 approved in principle the establishment of a school and asked the Ministers of Agriculture and Education to confer with the Senate of the University of New Zealand and recommend a specific proposal.

The Government's decision therefore concurs with the University Senate's recommendation, and Mr Holyoake said the University authorities would be called on to make detailed proposals.

The Government, said Mr Holyoake, had considered carefully a number of critical balancing factors before deciding on the site. It was completely satisfied its decision was correct. Massey College had an international reputation as a college of agriculture and dairy technology and was the most suitable site for the coordination of field activities, instruction, and research in association with university facilities.

Use of Some Stock Insecticides Prohibited

To be Withdrawn and Compensation Paid

THE withdrawal from farms and from trade channels of a large number of insecticidal preparations that have been used for the control of parasites on stock and for the control of flies is required under the provisions of regulations recently gazetted*.

Farmers and others affected are being advised directly by the Department of Agriculture of procedures for declaring and surrendering stocks, for which the Government has decided that compensation is to be paid.

EXTENSIVE investigations and testing of livestock products have shown that active ingredients in some insecticides tend to leave residues in the products from treated livestock; and that alternative chemicals now available are much safer to use and do not involve risk of residues.

The use on livestock of preparations containing aldrin, dieldrin, benzene hexachloride (BHC), lindane, DDT, and methoxychlor is prohibited.

These ingredients have been incorporated in preparations sold under a variety of trade names and a list of these has been gazetted, published in newspapers, and included with advice that has been sent by the Department of Agriculture to every farmer in the country, to manufacturers and retailers, and to others affected by the new regulations.

On a form that has been sent to all farmers the names and quantities of any prohibited preparations held at the date of the gazetting of the regulations (8 September), with net prices paid for them, are to be entered and the form and an accompanying declaration returned to the Department as requested in the advice from the Department, which also states the latest dates by which declarations and forms must be returned and the method of sending in surrendered materials.

Farmers who have not received advice from the Director-General by now should inquire of the nearest office of the Department. Public notices that are being issued in the Press are sufficient advice of farmers' obligations, but Departmental officers in districts have been asked to assist farmers in seeing that the prohibited preparations are declared and surrendered as quickly as possible. Gazetting of the regulations made it an offence to use any of the named materials.

Farmers packing materials for surrender should ensure that their names and addresses appear clearly on separate packages as well as inside complete parcels; otherwise there may be difficulty in establishing rights to compensation.

---

* The Stock (Insecticides and Oestrogens) Regulations 1961.

Prohibited Stock Remedies

The following are preparations containing prohibited active ingredients and which are to be withdrawn from use on farms:

"Aldane" Sheep Dip
Aldsan 40 per cent Aldrin Spray Concentrate

Boots Louse Powder

"Cleanso" Aldrin All Purpose Sheep Dip
"Cleanso" Aldrin Fluid Sheep Dip
"Cleanso" Aldrin Larvacide
"Cleanso" Anti-Blowfly Fluid
"Cleanso" Anti-Fly Dressing
"Cleanso" Dieldrin All Purpose Fluid Sheep Dip
"Cleanso" Dieldrin Fluid Sheep Dip
"Cleanso" Free Flowing Aldrin Dusting-powder Dip
"Cleanso" Free Flowing Dieldrin Dusting-powder Dip
"Cleanso" Gammexane Fluid Sheep Dip
"Cleanso" Gammexane Insecticidal Powder
C.M.R. Dieldrin Dust
C.M.R. Dieltox 20
C.M.R. Docking Fluid
C.M.R. Farm Insect Powder
C.M.R. Fly Strike Powder
C.M.R. Louse Powder
C.M.R. Pig Mange Dressing
C.M.R. Shower Dip Fluid
C.M.R. Shower Dip Powder
C.M.R. Spray Race Fluid
Cooper's Dieldrin Powder Dip
Cooper's Fluid Fly Dip
Cooper's Gamatox Powder
Cooper's Louse Powder
Cooper's Maggot Dressing
Cooper's Mange Dressing
Cooper's Shower Dip Fluid

Dielsan Dieldrin Misting Concentrate
Dielsan Dieldrin Powder Dip
Dielsan Sheep Dusting Powder
Di-Puff

Elliott's All-Dip
Elliott's All-Fly
Elliott's All Spray 40
Elliott's Diel-Fly
Elliott's Diel-Spray 25
Elliott's Flea, Lice and Insect Powder
Elliott's Magfoil
Elliott's Superfine Dieldrin Sheep Dust

"Gammexane" Insect Powder

Highland Dieldrin Powder Dip
Highland Fluid Fly Dip
Highland Shower Dip Fluid
Highland Superdip (Powder)

Insektol Fortis
I.W. Fly Repellent (containing Methoxychlor)

Little's Dieldrin Powder Dip
Little's Dieldrin Shower Dip Fluid
Little's Fluid Fly Dip
Little's Improved Fluid Dip
Little's Numex Powder Dip
Little's Numex Shower Dip Powder
"Lorexane" Dusting Powder

McDougall's Border Powder
McDougall's Dieldrin Powder Dip
McDougall's Fluid Fly Dip
McDougall's Shower Dip Fluid
Murton's Shear Cut Dressing and Docking Fluid

Neca "Gammexane" Louse Powder
Nexa Dip with Dieldrin Plus Gamma Oil
Nexa Pet Powder
Nexa Sheep Dip (Liquid)

Premier Aldrin Powder Sheep Dip
Premier Aldrin Spray Race Fluid
Premier Dieldrin Powder Sheep Dip
Premier Dieldrin Spray Race Fluid
Premier Louse Powder for Farm Animals
"Purr" Lindane Veterinary Insect Powder

Quibell's Dieldrin Powder Dip
Quibell's Fluid Fly Dip
Quibell's Gammadip Powder
Quibell's Shower Dip Fluid

Relionus Lindane Powder

Shell Defiance Blowfly Oil
Stantox Anti Fly Strike
Summit Insecticide

Tartan Aldrin Bath Dip
Tartan Aldrin Sheep Spray Concentrate
Tartan Aldrin Spray Dip
Tartan Dieldrin/Aldrin Sheep Spray Concentrate
Tartan Dieldrin Bath Dip
Tartan Dieldrin Blowfly Solution
Tartan Dieldrin Sheep Spray Concentrate

(Continued at bottom of page 342)

U.K.-N.Z. Agricultural Discussions

THE annual agricultural discussions between the United Kingdom and New Zealand were held in Wellington in August. These were the first to have been held in New Zealand. Sir John Winnifrith, Permanent Secretary to the Ministry of Agriculture, Fisheries, and Food, led the United Kingdom delegation and Mr P. W. Smallfield, Director-General of Agriculture, the New Zealand delegation, which included representatives of producer boards as advisers.

THE holding of the discussions here this year and a tour arranged by the Department of Agriculture for the United Kingdom party allowed the visiting officials to gain first-hand knowledge of New Zealand farming and its production and marketing problems.

A wide range of topics discussed included agricultural and marketing policies and production trends in both countries. Problems likely to arise if Britain were to join the Common Market were not a subject on the agenda, although possible repercussions were mentioned by the New Zealand delegation.

Dairy products naturally received a fair measure of attention, particularly the supplies of butter on the United Kingdom market. Meat market prospects in the United Kingdom, recent trends in lamb prices, and the production and marketing of apples and pears were also discussed.

"There was a frank exchange of views and the talks were held in the usual cordial atmosphere," stated a communique issued after the talks. "Much useful information and a good understanding of each other's point of view were obtained by both delegations. Each Government will give full weight to the views of the other in the formulation of production, marketing, and import policies relating to agriculture."

▲ At Ruakura Animal Research Station Sir John Winnifrith discusses animal production studies with the Station's Director, Dr C. P. McMeekan. At left is Mr W. C. Tame and at right Miss S. Campbell, both of the United Kingdom delegation.

→ In one of the country's most intensive dairying areas near Ohaupo Sir John hears from Mr H. V. Collison about the management of his 160-acre farm carrying 115 dairy cows supplying whole milk for tanker collection. At left are Mr G. E. Myers and Miss Campbell and at extreme right Mr Tame, all of the United Kingdom delegation.

Prohibited Stock Remedies

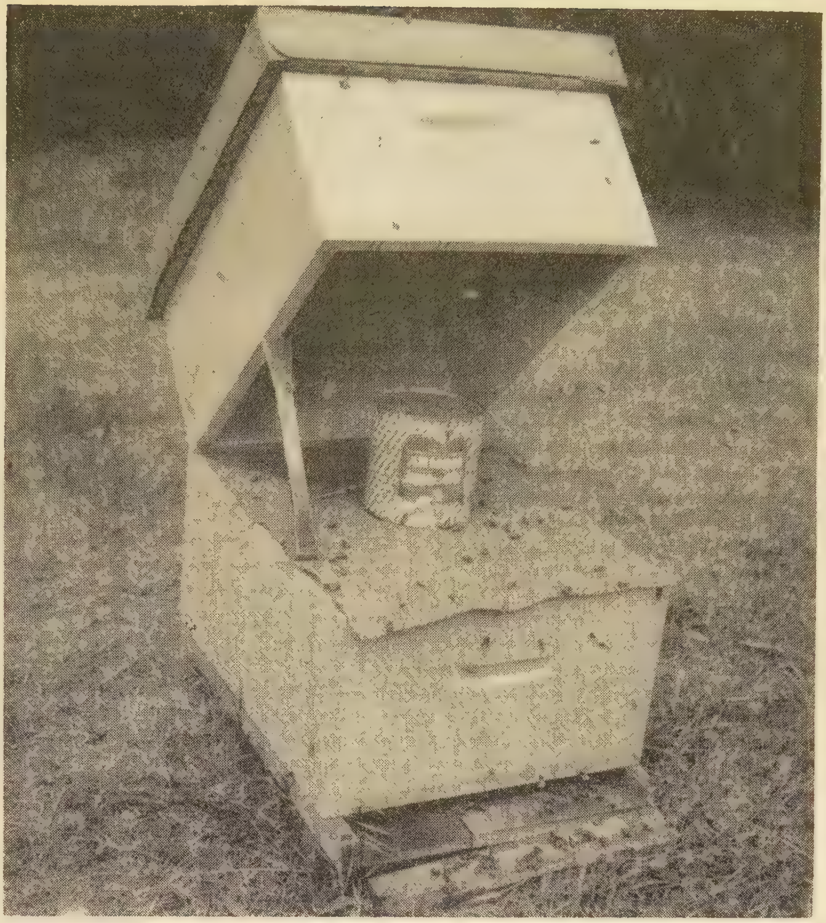
(Continued from page 341)

Tartan Dieldrin Spray Dip
Tartan Fleece Dust
Tartan L-K Bath Dip
Tartan L-K Spray Dip
Tartan "Micronized" Aldrin Sheep Dust
Tartan "Micronized" Sheep Dust
Tartan "Micronized" Sheep Dust (Winter Grade)
Tartan Procall Dust
TVL Aldrin Jetting Fluid
TVL Aldrin LK Dip (Fluid)
TVL Aldrin LK Dip (Powder)
TVL Aldrin LKB Dip
TVL Aldrin Spray Fluid
TVL Antiseptic Maggot Dressing
TVL Atlas Fluid
TVL Dieldrin Jetting Fluid
TVL Dieldrin LK Dip
TVL Dieldrin LKB Dip
TVL Dieldrin Spray Fluid
TVL Dieltas Fluid
TVL Lindane BHC Dip (Fluid)
TVL Lindane BHC Dip (Powder)
TVL Louse Powder
TVL Dieldrin Antiseptic Sheep Dusting Powder
Vet-Safe Fly Strike Aerosol
"Welcome" DDT Dispersible Powder
Young's Blue Label Liquid
Young's Blue Label Powder Dip
Young's "Defly" Sheep Spray
Young's Dieldrin Liquid Dip
Young's Dieldrin Supplement Powder Sheep Dip
Young's Green Label Liquid Dip
Young's Green Label Paste
Young's "Jason" Paste Dip
Young's "Jason" Paste Dip Dieldrin Quality
Young's Louse Powder
Young's Maggot Oil
Young's Sheep Dip Powder
Young's Sheep Dusting Powder
Young's Shower Dipping Fluid
Young's Special Fly Powder Dip
Young's Special Fly Powder Dip (Dieldrin Quality)
Young's Spray Dipping Powder
Young's Stud Bloom Fluid
Young's Universal Spray Dip
Young's Yellow Paste Dip B.H.C Quality

Colony Management during October

Seasonal Notes for the Domestic Beekeeper

By G. L. JEFFERY,
Apicultural Advisory Officer,
Department of Agriculture,
Gore



Method of feeding sugar syrup to bees, showing the position of the tin feeder over a hole cut in the hive mat.

OCTOBER is possibly the most critical month for colonies of bees that depend on a main honey flow during December and January. Brood rearing is now increasing and food reserves diminish rapidly when the weather is unfavourable. Swarming fever with its associated problems also tends to develop in many colonies during this period.

THIS month sources such as willows, dandelions, brassicas, and native shrubs may be important contributors to colony food reserves if weather is favourable. When there is such a spring flow the queen must have ample room for expansion of the brood nest; if it becomes congested with fresh honey and pollen, brood rearing becomes restricted and this is usually reflected adversely in the final honey crop.

Each colony should now have between five and seven full combs of worker brood. Colonies below this standard will require gentle expansion of the brood nest. Colonies weak in bees should be expanded only very gradually to avoid chilling brood during cold spells.

Building up a Weaker Colony

A weaker colony can be built up by occasionally shaking a comb of bees from a stronger colony on to the entrance. The younger bees will join those inside while older field bees will return to their own hive without fighting, as they might if they were shaken inside the hive. This method of expansion avoids the risk of chilling associated with spreading of brood and at the same time allows the colony to support a larger area of brood. The queen from the stronger hive must, of course, not be among the bees transferred by this method.

Colonies that have wintered in two stories will now be mainly occupying the upper super. The two supers can now be reversed to give the queen empty comb space directly above for expansion of the brood nest. Single-storey colonies should now be filling the hive fairly well and will require a second super, preferably of drawn comb. Comb foundation alternating with drawn comb is also satisfactory, whereas a full super of foundation may not be very attractive to the colony unless a good honey flow is in progress.

When only comb foundation is available, two frames of drawn comb should be taken from the lower storey and placed in the centre of the new super of foundation. The corresponding frames of foundation can be placed one on either side of the brood nest, just inside the pollen combs.

Food Supply

Some colonies may now be short of stores. There should always be some sealed honey in the hive if possible and two full combs of honey are the desirable minimum at this time of year. If stores are becoming dangerously low, it is false economy to hope for the best. Sugar syrup should be fed until the stores reserve is built up again.

Probably the easiest method of feeding syrup is by using preserving jars or a honey tin with the lid perforated with a few small nail holes. The filled container is inverted and placed over the centre of the cluster through a hole in the hive mat. An additional empty super is necessary to enclose the container of syrup. By this method the syrup is held in the container by

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Nankor is one of the newest organic phosphorous compounds and has proved its effectiveness in practical use in New Zealand last season.

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suction and removed by the bees as required.

When stores reserves are built up with sugar syrup, it is best to make a strong syrup and to feed it rapidly to avoid over-stimulation of brood rearing. A syrup of suitable strength can be obtained by using two parts of sugar to one of water by volume.

Occasionally pollen may not be available and in spring brood rearing may cease even though the queen is quite healthy and ample honey is available. If a comb of good pollen is placed in the colony, brood rearing will start again.

Swarm Control

Stronger colonies may now be making preparations to swarm. Swarming is usually more prevalent in colonies which are prosperous and in which sealed honey restricts expansion of the upper limit of the brood nest. If queen cells have not yet been started, swarming can be minimised by providing ample comb space for both brood and bees.

This may be done by placing one or two empty combs into the second super of brood; in very strong colonies a third super of empty combs may be necessary. Comb foundation placed alternately with drawn combs can be worked to advantage in this super.

Once cells are being formed they must be broken down at regular intervals and more drastic action taken with the hive. The younger brood should be packed into the lower storey of the brood nest, with sealed and hatching brood placed in the second and if necessary into a third storey. This arrangement of the brood will give the queen room in which to expand brood upward and so relieve any congestion. By reversing the positions of complete supers of brood the same object can sometimes be achieved.

If after this rearrangement of the brood nest the bees still make preparations to swarm, a substantial quantity of brood and bees may be removed and used to build up weaker colonies. The brood can be replaced with new combs to give the queen ample room for laying.

The collection of swarms can be a very good way of increasing the number of colonies. Provided the swarm is known to have issued from a disease-free colony, it can be put on to two or three drawn combs. The presence of some drawn comb usually minimises any risk of absconding.

If the origin of the swarm is unknown, it should be put on to foundation. This procedure will ensure that there is no carry-over of diseased honey. Swarms will establish better if fed a quart or two of sugar syrup when hived. This will encourage rapid building of comb and boost brood rearing. When increase is not required the swarm can be used to draw foundation and at the beginning of the honey flow can be united with another colony to increase its gathering power.

A new swarm will rarely gather more than winter stores, but the following season should make a good colony. If a surplus crop is desired, two swarms can be united at the beginning of the honey flow, though this means the sacrifice of one swarm for increase.

A swarm clustered on a branch of a tree before being taken in a box. Collection of swarms is one way of increasing the number of colonies, but there is some risk if swarms are from diseased colonies.

White-fleshed Turnips for Summer Fattening in Hawke's Bay

IN many Hawke's Bay high-rainfall districts and in drier areas when the spring or summer rainfall is more than average rape has not been a great success as an early lamb-fattening feed because of late and uneven ripening.

Though lower in dry matter than rape, white-fleshed turnip varieties have proved faster growing and capable of fattening lambs quite well. The leaf appears to be palatable at almost any stage of growth in any season. The recommended sowing rate is 2 lb of seed drilled per acre. This is much heavier than the usual seeding for winter feed crops and the result is a quick, abundant growth of leaf which suppresses weeds and provides a good bulk of fattening feed in about eight to 10 weeks from sowing.

The bulbs do not reach a large size. There is not time to educate the earlier lambs to eat large bulbs and it is better to fatten them on the leaf, which they take readily. The bulb remnants can be fed off by ewes as soon as the lambs are away. Delay in feeding off the bulbs in midsummer may expose them too much to high temperatures and dry conditions, which can make them unpalatable.

N.Z. Purple Globe and N.Z. Red Globe have given best results in trials. N.Z. York Globe is fast growing and early maturing, but tends to produce more bulb and not so much leaf and is not recommended for summer lamb-fattening feed if the other varieties are available.

White-fleshed turnips do not demand high fertility and 1 cwt of serpentine superphosphate per acre is all they require on most Hawke's Bay soil types. Seedbed preparation and feeding off recommendations are the same as for rape, though if wet weather delays cultivation, white-fleshed turnips can be sown later and an early crop is still assured.

—*H. J. JAGGER,*
Farm Advisory Officer,
Department of Agriculture,
Hastings

Cage Birds Can Be Imported from Australia

Cage birds can now be imported from Australia on permit. Consignments must be accompanied by veterinary certificates confirming:

(1) That the birds have been in an aviary in Australia for not less than three months immediately before the date of exportation to New Zealand and that they have not been affected by or in contact with any disease; or that the aviary has not been under disease control restrictions during that period.

(2) That they have passed a government veterinary examination for good health and freedom from external parasites within 14 days of shipment.

On arrival in New Zealand birds have to pass a Department of Agriculture inspection and then have to be kept in isolation on the owner's premises for 30 days. During that period they are subject to inspection.

Any sickness or deaths among the birds must be notified to the Department and all carcasses of birds that died must be retained for examination. Imported birds and their progeny must remain in captivity.

Applications for permits should be made to: The Director, Animal Industry Division, Department of Agriculture, P.O. Box 2298, Wellington.

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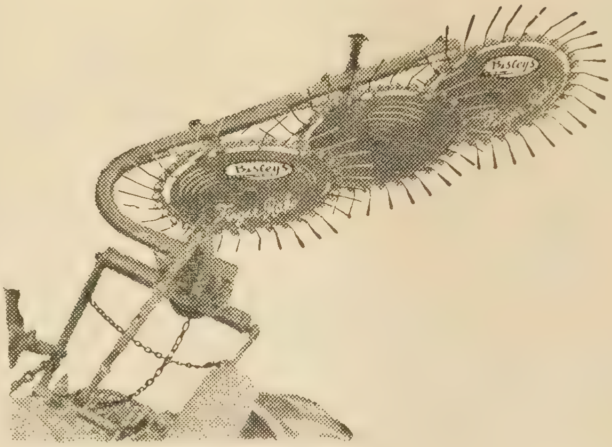

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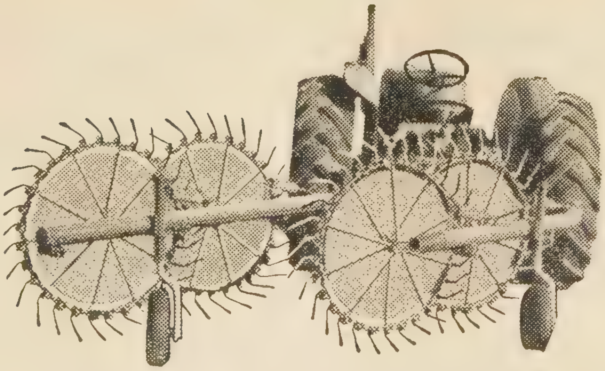

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VEGETABLE PRODUCTION

Therapeutic Control of Diseases

[*Sparrow*

By D. A. SLADE,
Scientific Officer (Therapeutants),
Department of Agriculture Horticultural Laboratory, Levin

DISEASES in vegetable crops cause considerable losses to growers. In addition to this the vegetable grower has a problem in the wide choice of materials at his disposal to be used for control of these disorders. To complicate matters, new materials are constantly being developed and may be offered to the growers under a variety of trade names. In this article the more important active ingredients of the therapeutants used for control of plant diseases are described. These materials are listed on the labels of containers where trade names for the formulations are used. If the grower knows brief details of the active ingredients of therapeutants, he is better able to compare trade products and select the correct material for his particular problem.

PLANT diseases can be grouped into three main types of organisms: Fungi (for example, botrytis on tomatoes and lettuce), bacteria (for example, the soft rots of cabbage are caused by bacteria), and viruses. Fungi and bacteria can be controlled by use of suitable therapeutants. Viruses cannot be controlled with therapeutants, but fortunately the spread of most viruses can be minimised by maintenance of high standards of hygiene and control of insect vectors. The therapeutants used for the control of plant diseases may therefore be divided into fungicides and bacteriocides.

FUNGICIDES

Copper Group

The well known older materials such as bordeaux mixture still have a definite place in vegetable growing.

1. Bordeaux Mixture

This material is prepared immediately before spraying by dissolving powdered bluestone in water, mixing burnt lime in a separate container with a small quantity of water, and adding these mixtures to the sprayer vat with the agitator running. On vegetable crops the material is normally used at 3 lb of bluestone and 4 lb of burnt lime to 50 gallons of water. This is known as a 3 : 4 : 50 mixture.

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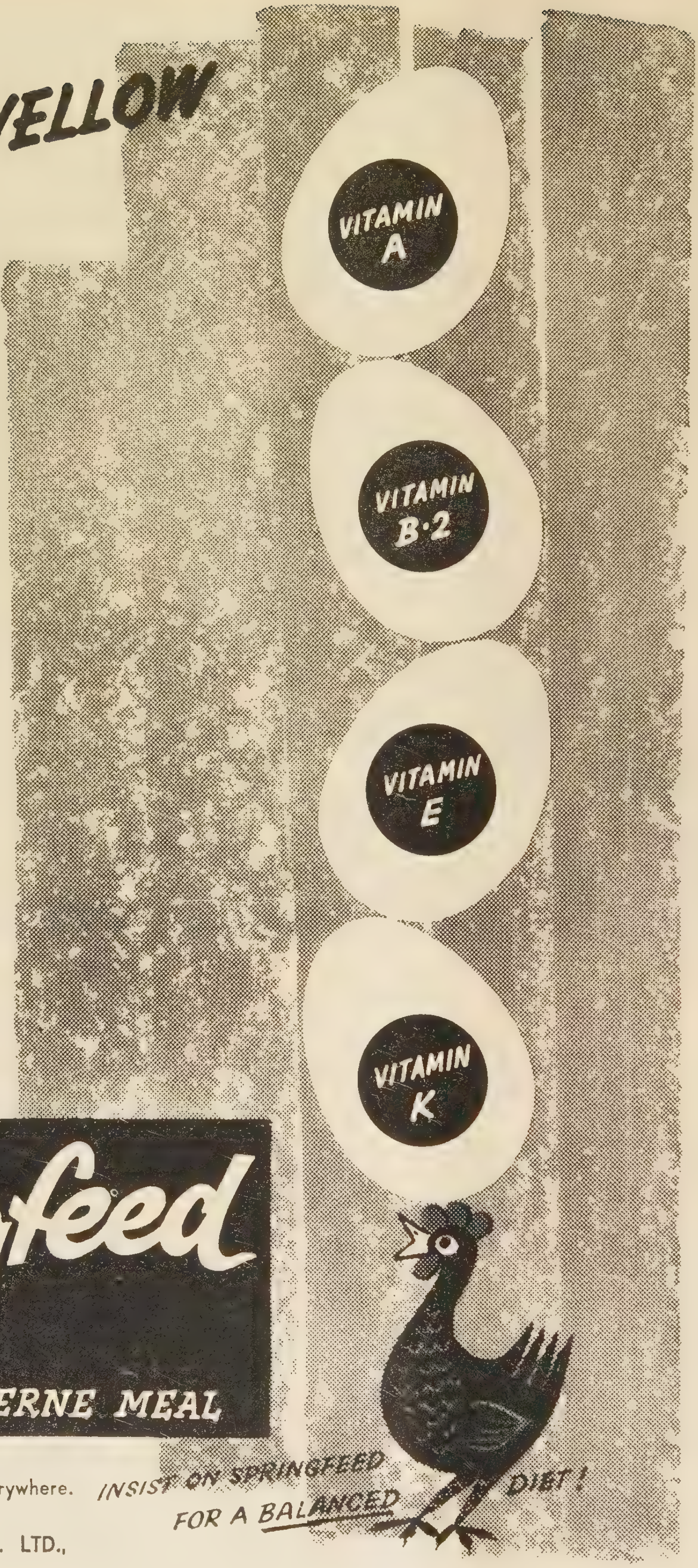
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It is one of the best fungicides, giving good control of diseases, but it has many disadvantages. Owing to the high lime content and the harsh action of copper on plants, continued use of bordeaux may reduce the yields of crops or delay maturity. The spray is very abrasive and is suitable only for high volume application. Because it contains lime, it cannot be combined with many of the sprays which are in wide use today.

Because of its powerful action against fungi and the stability of the deposit, its tenacity during wet weather, and its action against bacteria, it is still one of the main fungicides in many growers' programmes.

2. Burgundy Mixture

This is similar to bordeaux except that washing soda is used instead of lime. This mixture is still used by some growers, but its chief disadvantage is that crop injury is more likely than with bordeaux.

3. Other Copper Sprays

To overcome some of the disadvantages of mixing and using bordeaux mixture, other copper sprays can be used. Copper oxychloride, cuprous oxide, and colloidal coppers are some of the sprays which have been frequently used during the last 10 years. Copper oxychloride compounds are probably best known. Most of these sprays are good fungicides, but they tend to be severe in their action on soft foliage or tender plants. Because of this, many of the copper sprays, especially bordeaux, have been superseded by less severe fungicides.

Sprays containing copper mentioned above are useful for controlling diseases present during wet weather such as downy mildews of seedlings and potato blights.

Sulphur Group

Because of their simplicity and effectiveness, and due to improvements in the formulations of some types, fungicides in the sulphur group have retained their position in many spray programmes despite the availability of newer fungicides.

1. Colloidal Sulphur

This material, previously formulated as a thick paste which was difficult and unpleasant to mix, has been manufactured for some time as a wettable powder which is readily handled and mixed. Colloidal sulphur is compatible with most spray materials, except oils.

Sprays containing sulphur are active during dry weather and are used mainly against dry-weather diseases, including the rusts and powdery mildews. Colloidal sulphur is often combined with lime sulphur for control of these diseases.

Few crops are subject to as many diseases as tomatoes. Regular spraying with fungicides is essential in most parts of New Zealand.

2. Lime Sulphur

Lime sulphur contains sulphur in a chemically bound state called a polysulphide. This breaks down on the plant surface and liberates sulphur or other compounds active against fungi. It is very phytotoxic (damaging) to plants and has little use on vegetable crops unless it is applied at very dilute rates; for example, 1 gallon of lime sulphur to 120 gallons of water.

3. Sulphur Dioxide

This fumigant is produced by burning sulphur and is used by glasshouse growers to clean up houses after crops are finished and removed. It is probably easier to use than formalin sprays, but the latter should always be applied.

Dithiocarbamate Group and Related Materials

1. Dimethyl dithiocarbamate

(a) **Ferric salt (ferbam):** This is formulated as a black wettable powder and is a good, mild-acting fungicide used for the control of botrytis on flowering tomatoes and other fungal disorders. Unfortunately the black deposit is a disadvantage on vegetables, but inclusion of wetting agents helps to minimise this.

(b) **Zinc salt (ziram):** This material is formulated as a white, wettable powder and does not leave a conspicuous deposit on treated plants and foliage. It is used to some extent against leaf spots and botrytis, but does not seem as popular as the next members of this series.

2. Bis-dithiocarbamates (Dithane Group)

(a) **Nabam** (dithane D14): This, the first member of this group to appear, was formerly mixed with manganese or zinc sulphates before use. Today this is not necessary because the zinc and manganese salts are available commercially, and these materials have superseded nabam.

(b) **Zineb** (dithane Z78): The zinc salt of nabam.

(c) **Maneb** (dithane M.22): The manganese salt of nabam.

Zineb and maneb are very efficient fungicides for most types of leaf spots and blights. Maneb, a more recent introduction, appears to give better control of blight on tomatoes and potatoes than zineb. Many growers prefer to use these materials in place of the copper-based sprays because

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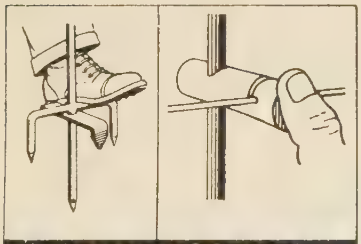

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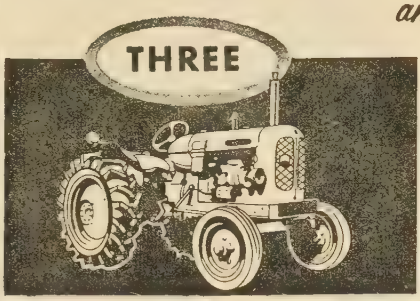

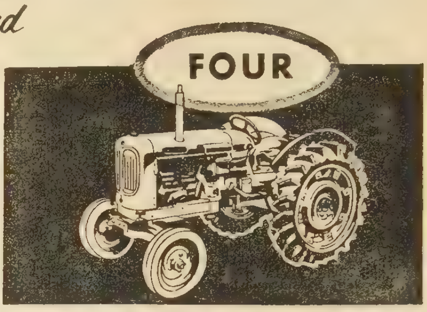

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they do not damage plants. Increased crops are often attributed to the milder action on foliage of these newer fungicides. Zineb is very efficient against most types of rust diseases and does not leave the objectionable deposit that colloidal sulphurs do.

(d) New materials belonging to this group: Because of the general activity of this type of compound, new combinations and compounds are being constantly developed and evaluated. Zineb and maneb are the only members of this group which are widely used in New Zealand at present. A copper salt is also available and was used in trial work last season.

3. Thiuram Derivatives

Thiram or TMTD: This material is composed of two dithiocarbamate units and is closely related to the previous groups. It is used on vegetables generally for protection from leaf spots, moulds, and fruit rots, including botrytis. Its control of botrytis generally appears to be superior to that given by the dithiocarbamates. They, too, however, give some measure of control over this fungus. Other uses of thiram are as a control for turf diseases, for control of onion smut, as a bird repellant on grain crops, and as a protective seed dressing.

Compatibility of These Materials

All dithiocarbamates and related materials are compatible with most other types of fungicides. However, mixing with lime and other alkaline materials, including stickers containing lime, should be avoided. In these combinations ineffective compounds are formed.

General

Members of these groups of materials are safe to use, being only slightly poisonous when diluted. However, most of them cause an unpleasant irritation and often unsightly and painful swelling of exposed skin, nose, and throat of some susceptible persons. Care should therefore be taken to avoid inhaling the powder during mixing. Persons susceptible to irritation should use appropriate protective clothing and face masks when using these materials. If these materials are used in a glasshouse, the operator should wear a face mask fitted with a filter. Barrier creams sometimes help to protect the hands. An occasional grower, despite the use of masks and gloves, etc., has had to use alternative materials (for example, captan) because of the irritant nature of members of this group.

Sufficient time should elapse between application and harvest to ensure that residues on food crops will be low.

Phthalamic Acid Derivatives

1. Captan

This protective fungicide is popular for the control of many fruit rots, leaf spots, and other fungal disorders. It may also be used as a soil and seed fungicide to protect young plants in the soil. The surface of potato seed pieces cut before planting may be protected by dusting with captan.

2. Phaltan

The properties of this material are very similar to those of captan. It is used as a protective fungicide against leaf spots, downy mildew, powdery mildews, and other similar vegetable disorders. It may damage young cucumber seedlings if the temperatures are high. Overseas research suggests that blight control has not been as efficient as that obtained with dithanes.

General

These materials are in general very mild-acting fungicides which are widely used in all aspects of horticulture. Phaltan, a recent introduction, is rapidly becoming a popular fungicide for ornamental crops.

Being relatively non-poisonous the materials can be used to protect fruit and vegetables from disease fairly close to harvest, but an interval of at least seven days between application and harvest is advisable to ensure that deposits are within the permissible range. Efficacy is improved by including a sticker during wet weather. They are compatible with most materials except oils and those containing lime.

Quinone Group

1. Dichlone (Phygon)

Dichlone is a wettable powder used for protecting some crops against fungal infection, but its use is limited because it is damaging to many crops. It can be used safely on glasshouse tomatoes for botrytis control if the rate does not exceed 1½ oz per 1,000 plants. This material does not leave a visible deposit on the fruit. Dichlone has also been recommended as a pre-storage and pre-planting treatment to protect kumara "seed" and plants from black rot. It will also protect cut seed potatoes from fungal disorders. This material may be used as a seed dressing on legumes, beet, and many other crops. Treated seed should not be fed to stock.

Though it is relatively non-poisonous, this material may cause a skin irritation under warm conditions.

2. Chloranil

This is the active ingredient of many commercial seed dusts and is used to protect the seed in the soil during germination until the seedlings become established. Normal rates used vary from 2 to 3 oz per bushel, while with small seed 6 oz of the active ingredient should be used per bushel. Chloranil is not suitable for use on beet seeds.

[*Florida Citrus Experiment Station*

Protective clothing and face masks may be needed when some types of fungicides (see text on this page) are being used, as they can cause irritation and often swelling of exposed skin, nose, and throat in susceptible persons.

Organic Mercury Group

1. Phenyl Mercuric Compounds

This group of materials is very poisonous to man, but at low rates of application these fungicides are very effective and capable of entering the surface of the plants, where they are said to eradicate recent fungal infection. However, the phenyl mercuries will not kill infections which have been established within the plant for a few days. Because of their power of penetrating the surface of plants, where they become fixed and are not subject to weathering, these materials cannot be used on any vegetables where the treated parts are eaten. Fruit and vegetables with high mercury residues are not fit for human consumption.

The only exception to the use of phenyl mercury on edible vegetables is where it is applied to glasshouse tomato crops as an aerosol. Provided

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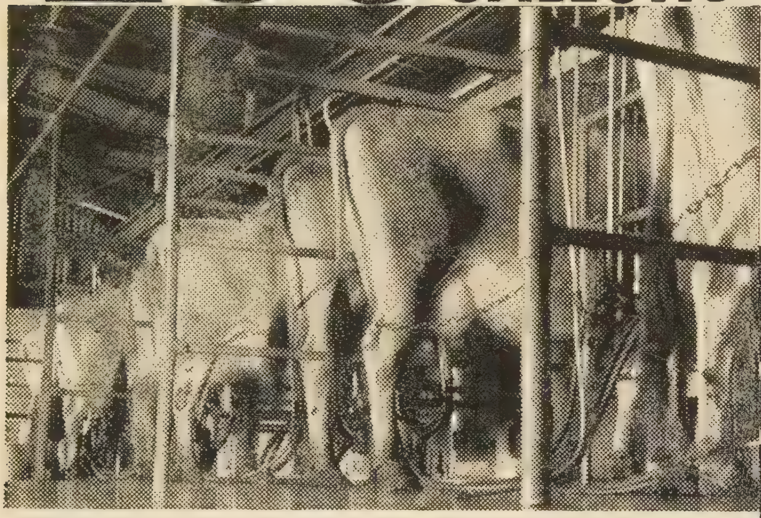

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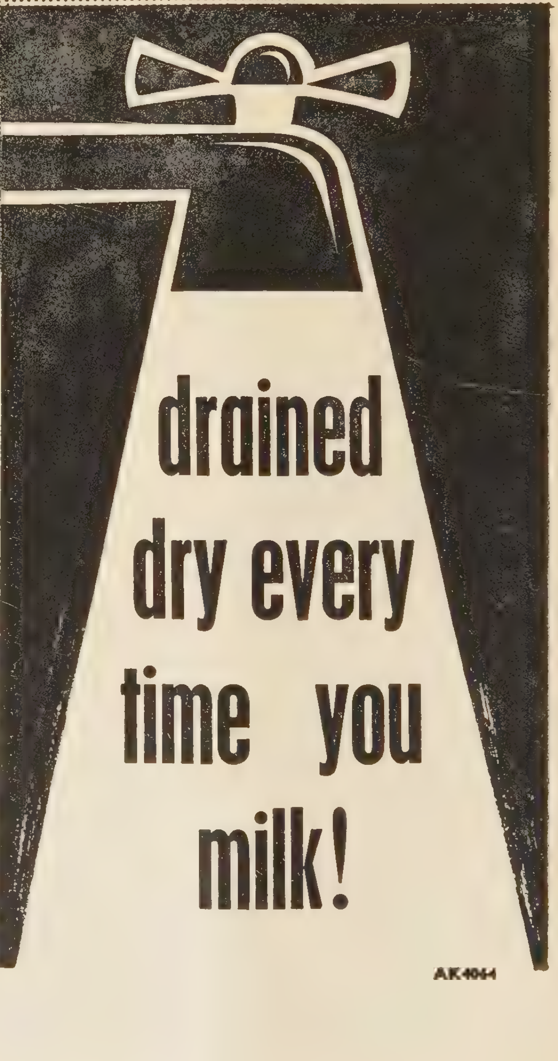

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applications are made at intervals not closer than seven days residues will not be in excess of the tolerances laid down by the Department of Health.

Commercial formulations are available where the phenyl mercury is combined with copper oxychloride. **This formulation is made strictly for the control of blight on potatoes and should not be used on any other crop.**

2. Other Types of Organic Mercuries

Many seed dressings contain organic mercuries. These materials are often capable of penetrating into the seed to kill systemic fungi within the seed tissues as well as fungi adhering to the outside of the seed.

Inorganic Mercuries

These (for example, calomel, corrosive sublimate, and yellow oxide of mercury) types of materials, though efficient fungicides, are restricted in use to soil dressings for control of pathogenic fungi in the soil. Occasionally they may also be used for protection of potato seed pieces, control of turf diseases, and seed dressings. They cannot be applied to plants because of the damage they cause and their poisonous properties.

Other Materials

Three materials, "Allisan", PCNB, and TCNB, are being experimentally evaluated in New Zealand for the control of botrytis and sclerotinia-type diseases.

BACTERIOCIDES

Bacterial disorders are difficult to control because of the nature of bacteria and because wet conditions favour their spread and multiplication. At present only copper sprays can be recommended for control of bacterial disorders on vegetables. Much research is being done overseas on antibiotics, but so far no recommendations can be made.

GENERAL COMMENTS ON USE OF THERAPEUTANTS

Emulsions and Wettable Powders

When an emulsion is prepared the therapeutant is present as very small particles suspended in water. In this form it is more active. Theoretically, therefore, an emulsion should give better and more efficient therapeutic cover. However, the solvent used to dissolve the active ingredient is often damaging to plants. Because of this, caution is essential when emulsions are used on tender plants.

Compatibility is also a problem with emulsions because one must consider the compatibility of the solvent with the other materials. If growers wish to combine emulsions with other therapeutants, but are doubtful of the combination, they should mix a small quantity and apply it to the crop to make sure that it can be mixed without causing a breakdown in the sprayer or injury to the crop. Manufacturers generally state what materials can be mixed with their emulsions but this often applies only to the same brand of therapeutant. Other manufacturers may use different solvents.

By following compatibility charts it is possible to determine what wettable powders are compatible with others. Some materials are available as both wettable powders and emulsifiable concentrates. Some are formulated only as emulsifiable concentrates.

Stickers and Spreaders

A spreader must be included in most sprays applied to plants with waxy leaves to prevent run-off of the spray material and to promote even coverage of the plant surface. Stickers prevent the rain from washing off the protective therapeutant cover. With all fungicides applied from autumn until spring a sticker should be included; otherwise very little rain may wash off the protective covers and the plant is left exposed to attack from fungi.

During wet weather inclusion of stickers can mean the difference between control and crop loss due to diseases favoured by winter conditions.

Compatibility

When spraying for one particular disease it is often expedient to include other therapeutants at the same time for the control of diseases of less importance which are also present. By consulting compatibility charts the grower can determine what materials can safely be combined.

However, these charts generally refer only to dilute or high volume spraying. Caution should be exercised when combination sprays are made and applied with concentrate spraying equipment.

If materials are used neat or mixed with a minimum of water, it is usually not wise to use combination sprays. Growers who have problems with the compatibility of sprays should get in touch with their nearest Horticultural Advisory Officers.

Minimising Risk of Poisoning

Spray materials are very useful if used correctly and intelligently. Before mixing sprays read the label and learn all you can about them. Treat them with respect. In this way you will get maximum control of diseases.

Horticulture Division officers are able to give advice on new materials or others you may wish to use. If in doubt, see your local advisory officer.

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A SUBSCRIPTION to the *Journal* is a most useful Christmas gift for a friend or relative, particularly one taking up gardening on a new property.

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NOVEMBER WORK IN THE HOME GARDEN

[*Sparrow*

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

FROST danger has passed even in the colder districts early in November and frost-tender plants such as marrows, cucumbers, dwarf and runner beans, sweet corn, kumaras, and tomatoes should grow well in well drained, moist soils that have warmed enough. Winter greens such as savoy cabbage, winter cauliflower, and Brussels sprouts are not less important and in most districts seed can be sown to provide plants for setting out in late December or January.

SOWING AND PLANTING

SOW OR PLANT WHEN FROST DANGER HAS PASSED

Beans (dwarf and runner), cucumbers, marrows, New Zealand spinach, pumpkins, squash, sweet corn, tomatoes, yams. In specially favourable situations: Egg plants, kumaras, melons, okra, peppers.

SUCCESSIONAL OR MAIN-CROP SOWINGS

Beetroot, cabbages (summer and pickling), carrots, cauliflowers, Chinese cabbages, celeriac, herbs, kohl rabi, lettuces, onions for salads, parsnips, parsley, radishes, salsify, scorzonera, silver beet, spinach beet, swedes, tampala, turnips.

PLANTS AND TUBERS TO SET OUT AS REQUIRED

Brussels sprouts (an early planting if necessary), cabbages (summer or autumn), cauliflowers, celery, celeriac, cucumbers, lettuces, potatoes (late planting if desired).

Beetroot and carrots can be transplanted in favourable circumstances.

*SOW FOR WINTER USE AS REQUIRED

Broccoli, Brussels sprouts, cabbages (savoy or winter), kale or borecole.

* Except in favourable far northern districts, when later sowing is satisfactory.

Beans

THE sowing of frost-tender beans was discussed in last month's notes.

Dwarf

Good varieties of dwarf beans include the following.

Black Valentine: Heavy bearing with dark green, stringless pods about 7 in. long. Often used for a second early or main crop.

Masterpiece: Crops well with straight, stringless pods; for early main crop or late sowing.

Tendergreen: Crops well and has tender, dark green, straight, fleshy, round pods 6 in. long.

Climbing

Good climbing varieties of beans include:

Fardenlosa (Market Wonder): Widely grown commercially because it crops heavily with straight, tender, fleshy, stringless beans up to about 10 in. long. A strain of Fardenlosa, "Fardenlosa Shiny Pod" (also listed under several other names) is now widely grown. It has attractive shiny green pods reputed to retain their crispness longer after harvesting than do those of the ordinary strain of Fardenlosa.

Westralia: A useful variety somewhat similar to Fardenlosa in cropping. As it appears to be highly resistant to bean rust, it should be specially valuable in districts, particularly in autumn, where that disease is troublesome.

Other useful varieties of dwarf and climbing beans are listed in seedsmen's catalogues.

Celery

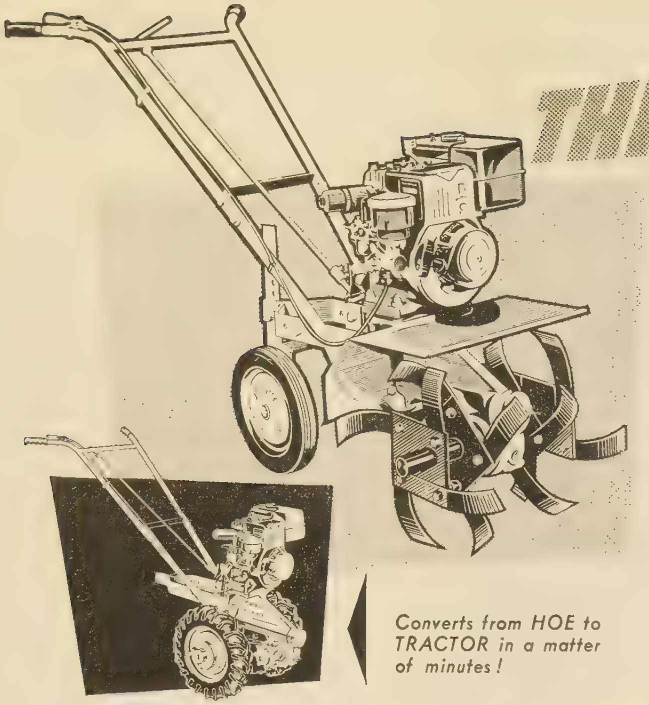
Where conditions are favourable celery can be set out in November. Good varieties of green celery are unsurpassed for texture and flavour and deserve to be grown more widely. An article on the culture of celery appeared in the July "Journal".

Cucumbers, Pumpkins, Squash, Marrows, and Melons

The culture and soil requirements of cucumbers, pumpkins, squash, marrows, and melons are similar, though melons need warmer conditions than the others. None of these plants should be sown in the open to be above ground before frost danger is past. Moreover, the ground must have warmed sufficiently and not be too wet or the seed is liable to rot. The plants thrive in a wide range of soils from sandy to moderately heavy provided there is an assured supply of moisture (preferably held in the soil) and plenty of organic matter.

Well drained, light, warm, aerated soils are best for early crops, but for main crops heavier soils usually give a higher yield over a longer period. Organic matter can be increased by digging in a green crop, but better results are obtained, particularly in colder districts if 1 cu. ft. of soil is removed at intervals of 2 to 3 ft and the holes, except for the top 3 or 4 in. are filled with partly rotted, fermenting stable manure and then filled up with soil.

Seed can be sown in the soil placed on top, or preferably at the edge, of



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the manure. Rows of plants should be at least 4 ft apart. This is known as the hill system of sowing. The ground should, if possible, be level after sowing to facilitate any necessary watering.

Apart from watering and weed control established plants should need very little attention. With trailing varieties it may be necessary to pinch out the ends of leaders when they are about 18 in. long to encourage the development of laterals. Plants can be trained by pegging the runners with sticks.

The fruit of marrows should be cut when young, preferably before the skin hardens to the extent that it cannot be broken easily by the thumbnail; 10 to 12 in. is a good size. As marrows increase in size their flavour usually is reduced and the seeds increase in size. In favourable seasons, too, early cutting of the fruit induces more to develop. It is, therefore, inadvisable to allow fruit to reach full maturity unless very large specimens are wanted or fruit is to be stored for winter.

Onions

Weed control is particularly important in the production of onions. Weeds not only use available plant food and so cause a reduction in the crop, but when conditions are damp they tend to create an environment unfavourable to the ripening of the bulbs. Diseases such as mildew and to some extent neck rot are also liable to be more troublesome. A good growth of weeds also provides a congenial environment for many insect pests.

Weeds between the rows can readily be destroyed in hot weather with a sharp hoe. Between the plants weeds must be pulled by hand or they can be removed with a bent knife blade or piece of flat steel sharpened as a knife and bent.

Root Crops

Successional or main-crop sowings of carrots, parsnips, turnips, beetroot, celeriac, or radishes can be made in November. They do well in a soil that received a liberal dressing of good organic material for the previous crop, and commercially the best crops are usually produced on deep, light loams well supplied with organic matter.

The soil should be well supplied with plant foods, and well rotted poultry or farmyard manure gives good results if it is well mixed throughout the root area. Lumps or pockets of fertiliser may interfere with the development of the tap root and result in its distortion.

Where artificial fertiliser is needed, 6 parts of blood and bone mixed with 1 part of sulphate or muriate of potash is likely to give good results on many soils. It can be applied at 3 to 6 oz to the square yard. Alternatively the following mixture can be applied at about 2 to 4 oz to the square yard: 2½ parts of sulphate of ammonia, 4 parts of superphosphate, and 1 part of sulphate or muriate of potash.

Either of the above mixtures can be used as a general purpose fertiliser in the vegetable garden, though leafy vegetables may benefit in addition from side dressings of a nitrogenous fertiliser such as sulphate of ammonia, nitrate of soda, or dried blood.

[*Green and Hahn*

Keeping onion crops free of weeds not only allows them to develop better but helps to reduce risk of mildew and neck rot infection.

Vaccination of Calves against Contagious Abortion

VACCINATION of calves against contagious abortion (brucellosis) is now widely accepted as a routine procedure. Early inquiry of Departmental officers or club veterinarians should be made to ensure inclusion in the heavy programmes of vaccinations beginning in January and February.

Contagious abortion can cause serious disease in humans as well as serious economic losses to dairy farmers. Beef cows are also susceptible to the disease and the calving percentage of beef heifers can be increased by vaccinating them before mating.

Vaccination has reduced the average rate of abortion in New Zealand dairy cows from 5 per cent to 1 per cent. A surprising number of farmers still do not avail themselves of the vaccine, which is safe, reliable, effective, and cheap.

It cannot be too strongly urged that all dairy farmers vaccinate all calves between four and eight months. It would be a mistake to regard past freedom from abortion as a good reason for not vaccinating, as infection may be introduced into a herd at any time.

Avoid a costly omission and book vaccination now through a Department of Agriculture officer or club veterinarian.

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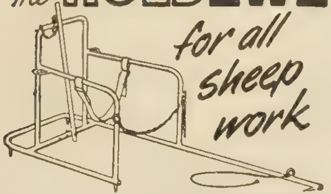

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MORE BEEF as Additional Production from SHEEP FARMS

HOW more beef might be produced from sheep farms without disturbing the present recognised pattern of wool and meat production was suggested by R. H. BEVIN, Executive Officer, New Zealand Meat and Wool Boards' Economic Service, at the Ruakura Farmers' Conference. This article is an adaptation of the paper he presented.

THE New Zealand Meat Producers Board has always been concerned with the stepping up of our beef export, and its pre-war advocacy of chilled beef for Britain is an example of its thinking. The years of war and post-war bulk purchase gave little opportunity for policy formulation, but with free marketing re-established in 1953 beef expansion came in for discussion again.

Our lamb numbers were moving up and with only the United Kingdom market it was feared that over-supply would bring trouble to our sheep farmers. Hence the proposal that a measure of the expanding carrying capacity should be devoted to beef production.

My own thinking on the whole proposition is around a series of farming and marketing aspects which have been raised at various times over the last few years.

1. Our production of sheep meats has risen as our sheep population approaches 50 million.

2. Our lambs (of which we are exporting about 18 million) are still marketed largely in the United Kingdom.

3. Our market for surplus mutton is firmer than we had hoped for and promises to remain so.

4. At the same time sheep meats are not yet universally acceptable.

5. Beef on the other hand is widely acceptable, except where religious prejudice rules it out.

6. We should reasonably consider then how as meat producers we can best balance our output of sheep and beef meats to gain the greatest advantage in the export markets.

7. We are essentially sheep farmers as long as the combined net income from wool plus meat is greater than that from meat alone.

8. In parts of New Zealand where cattle raising is carried out we are basically grass farmers with little arable activity.

9. On the cattle breeding country improvement through oversowing and topdressing has changed the pattern of grass availability. More feed, and over a longer growing period, opens up the question: More ewes or more breeding cows?

10. On the cattle fattening country we can by the best management techniques raise our dry-matter production to say 12,000 lb per acre. Again the question is more fat lambs or more beef? Can we step up our ewe flocks still further to deal with the extra feed, or are there physical difficulties for the individual farmer in this course?

11. If we continue to topdress, oversow, subdivide, and generally improve our grasslands, we must tackle this question of full utilisation, and here the sheep and beef cattle question has to be answered.

12. The periodicity of pasture growth in our North Island country with a 40 in. rainfall and higher leads us directly into the matter of how best to use the late summer and autumn feed if, as we should, we base our sheep

farming on (a) early weaning of lambs and (b) early disposal of lambs to the works.

13. The climatic variability of our seasons is such that while we may base our stocking on a certain level of feed production, there is such a margin of risk that full stocking of breeding stock—for example, ewes in fattening country—is at least inadvisable, and a margin of flexible stocking which cattle can provide must be closely considered.

New Pattern

Each of the foregoing points can provide a basis for argument where meat production policies are being discussed. I would suggest that with our present stocking in the Auckland and east coast districts the next few years will see us emerging from the standard established practices of the 1920s to the early 1950s into a new pattern of meat production for the period of the mid 1950s onward.

The intensifying of the liaison between the breeder and the fattener is proceeding steadily. More stock are being offered at the annual fairs for weaners and store cattle, and the importance of these sales in the annual farming routine is increasing.

The opening up of the North American market offers scope for disposal of boned out and cartoned beef; hence the falling off of our export of carcass beef, both frozen and chilled. This has meant a considerable increase in the value of cow and bull beef, which in earlier times was not highly regarded.

It has also directed attention to the possible value of crossbred beef produced as a by-product of dairying, the possibilities of which have been shown by Ruakura Animal Research Station. The disposal of one million or so calves as bobbies constitutes one of the most wasteful aspects of our pastoral farming.

Sooner or later we must become nationally aware of this and so gear our management practices to turn this source of beef to infinitely better account. The Meat Board is actively following its advocacy of calf use for beef by encouraging work on this beef production problem. In the meantime we have returns from the Herd Improvement Department of the Dairy Board on the disposal over the last three years of some 6,000 A.B. crossbred calves by Hereford bulls dropped in spring 1959 from dairy cows. The results are shown in Table 1.

TABLE 1—CROSSBRED CALVES BORN TO HEREFORD BULLS 1959

TOTAL CROSSBRED CALVES REARED AND SOLD TO EIGHT MONTHS

Age when sold	Number	Average price £ s. d.
1 month or less ..	158	3 19 0
2 months	40	7 8 0
3 months	105	10 0 0
4 months	287	11 10 0
5 months	239	13 8 0
6 months	318	13 13 0
7 months	166	13 14 0
8 months	58	11 10 0
Total	1,371	—

SALES OF CROSSBRED CALVES

Age when sold	Sold as fats Number	Sold as fats Average price £ s. d.	Sold as stores Number	Sold as stores Average price £ s. d.
9 months ..	28	11 16 0	35	13 1 0
10 months ..	15	15 17 0	2	18 10 0
11 months ..	41	17 16 0	—	—
12 months ..	29	19 3 0	18	10 17 0
13 months ..	30	16 9 0	5	19 0 0
14 months ..	13	21 1 0	—	—
15 months ..	58	20 18 0	15	25 0 0
16 months ..	37	21 0 0	1	24 0 0
17 months ..	5	25 8 0	—	—
18 months ..	59	23 4 0	1	15 0 0
19 months ..	8	30 11 0	—	—
20 months ..	53	25 0 0	—	—
Total ..	376	—	77	—

Total of all calves sold to 20 months: 1,856

Shed Feeding in Winter

The practicability and desirability of shed feeding of cattle in winter warrant attention. In Southland Mr H. Pinckney has taken up this form of feeding his weaners for 100 days more or less to lead on to summer fattening. Self feeding on silage and hay appears to be proving there as elsewhere to be practicable, and modern building construction methods should be capable of adaptation to provide the necessary shelter at economic cost. The project is still proceeding this year and with the final disposal of some 80 head we can have a good look at what it all adds up to.

In brief, three avenues call for constant exploration by both research workers and farmers on the fattening country:

1. How best to convert high-producing pastures into meat to get the most economic use of labour, livestock, and fodder available over the whole year.
2. How best to weld the surplus calf crop from our dairy farms into our beef-producing scheme.
3. How may we so improve the winter feeding of stock to accelerate the output of beef in late spring and summer and so maximise the use of our pastures for fattening.

Beef from South Island Irrigated Areas

Beef potential of South Island districts where irrigation is being used also warrants attention. Here the feed production pattern for summer and autumn has been altered to approximate North Island conditions.

At the Department of Agriculture's Winchmore Irrigation Research Station trials have been under way for the last four years. The dairy farm has been converted to a fattening farm and it has been shown that considerable study on the production of beef on irrigation country has still to be done.

TABLE 2—MEAT PRODUCTION PER ACRE, WINCHMORE IRRIGATION RESEARCH STATION

Year	Sheep alone lb	Sheep and cattle lb	Cattle alone lb
1957-58 ..	210	(157 + 155) 312	310
1958-59 ..	213	(152 + 130) 282	245
1959-60 ..	270	(166 + 109) 275	261
1960-61 ..	245	(150 + 150) 300	245*

* Estimated

As I see it at present sheep with cattle can be effectively worked in to use the feed available. The meat production per acre over the last five years is shown in Table 2. The fact that wintering of cattle has presented many problems should not deter us from the study of this type of farming in Canterbury, for sooner or later irrigation of the plains must expand and the breeding of more cattle on the foothills and downlands must develop as the demand grows for weaners and stores to meet the needs of the irrigation farm fatteners.

No Easy Way

There is no easy way to a realisation of our beef cattle expansion. But the experience of the 1950s, when our numbers moved up from 2 million to 3 million, shows that given the finance for pasture improvement and a reasonably competitive price for beef, the sheep farmers on the hill country can expand their herds. The cyclical uncertainty in price has been the main deterrent, but this may not be an insurmountable barrier as the agricultural policy of the future emerges, determined as it must be on the primary consideration that the volume of our exports must continue to rise to meet the needs of the ever-growing population.

Can we aim on the farm at 250 lb of meat per acre for a start and go up from there? And is it a reasonable assumption that to get the best use of our resources 60 per cent or 150 lb comes from our sheep and 40 per cent or 100 lb comes from beef? A Meat and Wool Boards' survey has generally established this ratio for South Auckland farms with an average production of 180 lb of meat per acre.

Hope for the future lies in a recently completed return from one of the survey properties of 260 acres, the production of which for 1959-60 was 406 lb of meat and 80 lb of wool per acre. This indicates what potential there still is when land, climate, livestock, pasture management, and stock husbandry, coupled with the efficiency of the farmer himself, combine to get the most out of New Zealand grassland.

◆

Progress in
FACIAL ECZEMA RESEARCH

Dead litter is the natural habitat of the facial eczema fungus.

A DRAMATIC break-through in facial eczema research was the discovery in 1958 that a microscopic fungus associated with pasture was the source of facial eczema toxin. How this break-through has changed the whole character of research was explained by C. P. McMEEKAN, Director of the Department of Agriculture's Ruakura Animal Research Station in a paper given at the annual Ruakura Farmers' Conference, an adaptation of which follows.

AS the result of a sound piece of observational work on his part, C. M. Percival of Ruakura collected the fungus in the field from a facial eczema "hot spot" area.

R. H. Thornton of the Soil Bureau cultured a very high-sporing strain of the fungus selected by him from the material provided.

When this culture was fed to both guinea pigs and lambs at Ruakura, liver damage indistinguishable from facial eczema was produced.

Thus for the first time it became possible to produce the disease experimentally in the laboratory. For the first time it became worth while for other research institutions having different skills and equipment to follow up the different facets of the exciting field opened up.

Within a few months a large number of scientific specialists at eight different research centres, apart from Ruakura, were encouraged to interest themselves in various aspects of the problem. The Ruakura group was augmented by three Research Fellows recruited from overseas and by Dr R. L. M. Synge, of the Rowett Research Institute, a Nobel Prize winner in chemistry. Another Research Fellow of the Department of Agriculture was located at the Plant Chemistry Division in Palmerston North.

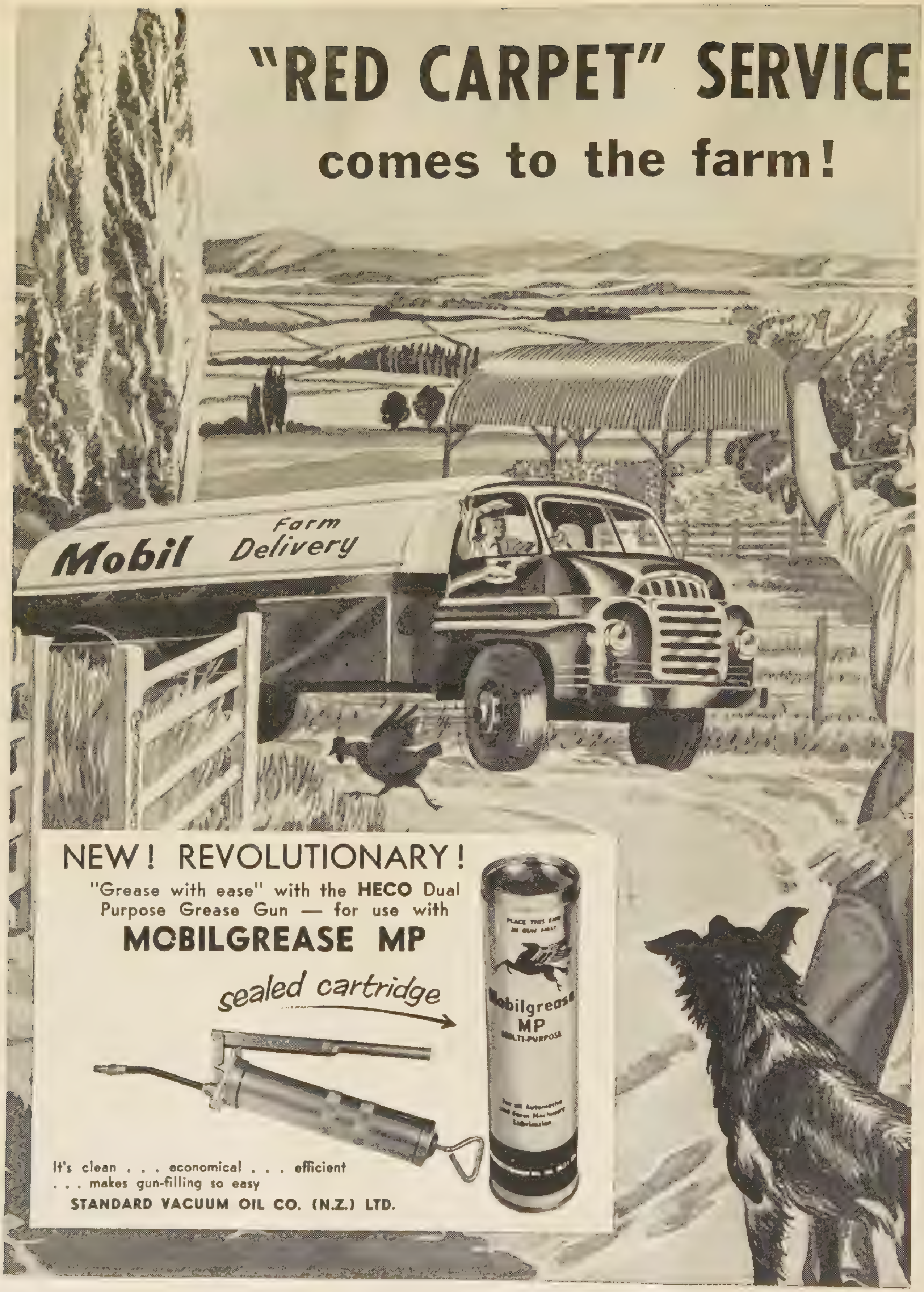
During the next two years the research ranged widely and resulted in the collection of a very large amount of data on almost every facet of the disease.

This initial burst of energy was naturally exploratory. Its main function and consequence have been to set the present pattern of the research, which is now well established.

Today the bulk of the work is being conducted by two institutions, Ruakura and Plant Diseases Division, Auckland. The other bodies are not out of the field, however. They still retain an interest in various specialised aspects, and in addition make their facilities and staff freely available to those carrying full-time responsibility in the two main groups.

RESULTS TO DATE

Summarisation of the immense amount of the new knowledge gained is extremely difficult. Only the salient points can be mentioned, and time will not permit giving credit to all the individuals and institutions that have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contributed. This summary would not have been possible, however, without the close collaboration of the personnel of the Department of Scientific and Industrial Research's Plant Diseases Division (Auckland), Grasslands and Plant Chemistry Divisions (Palmerston North), Dominion Laboratory (Wellington), Fats Laboratory (Wellington), and Soil Bureau (Taita); the Department of Agriculture's Rukuhia Soil Research and Wallaceville Animal Research Stations; and, of course, Ruakura. In addition to these we have had the assistance of several laboratories in Australia, the United Kingdom, and Germany.

Pithomyces Chartarum

The fungus has had several names during the course of the study, but has apparently been correctly and finally christened *Pithomyces chartarum.*

It is a saprophite, living and reproducing itself on the dead material on the ground and at the base of pasture plants. It does not grow on the green leaves. It requires for its rapid development and growth a supply of leaf debris as food, relatively high temperatures at or near ground level, and high humidity.

Its life cycle is very short, proceeding from spore to spore in only a few days. Under favourable conditions it is capable of producing millions of spores per square foot of pasture in this short time. Some of these spores lodge on the green leaves of an infested pasture. They adhere to these leaves very firmly and are taken in by stock grazing the sward.

A wide range of types or strains of the fungus grows in the field, and from study of these it is apparent that the fungus possesses a marked capacity for genetic variation, and in consequence it can easily adapt itself to different and particular conditions.

Collecting sample of spores for toxicity tests.

The field strains thus appear to vary continuously according to changes in environment.

The fungus grows well on almost all species of common pasture plants. It grows particularly well on Yorkshire fog and short white clover.

From seasonal studies of its behaviour in the field it is clear that the fungus overwinters in the spore form in small numbers on most pastures and that multiplication occurs with the coming of warmer conditions of spring and summer.

An almost explosive development can occur in late summer and early autumn when there are suitable high temperatures, high humidity, and adequate plant debris, and where the build-up of the fungus has already reached fairly high proportions. Our knowledge in these matters has come largely from the work of P. J. Brook and Miss J. M. Dingley of Plant Diseases Division.

The fungus can be cultivated readily in the laboratory on a large scale. The different strains collected from the field have varied widely in toxicity. A high-sporing strain is necessary for large amounts of toxin to be produced. The poison is present in the spores, in the mycelium or body tissue of the fungus, and in the material on which the fungus is grown.

Most of our detailed work in the laboratory has been done with one strain, known as "Strain C", which is that originally isolated by Dr Thornton from material from Claudelands racecourse. This strain has enabled us to produce large amounts of toxin for chemical, biochemical, and pathological

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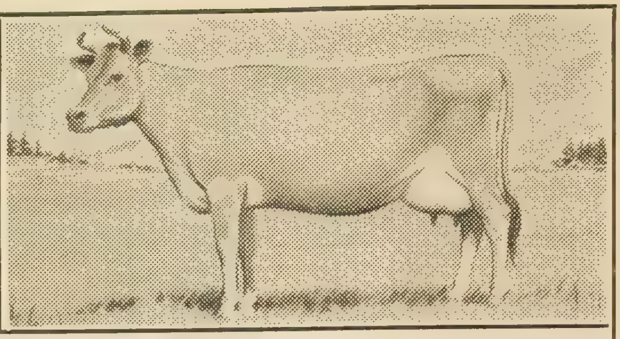

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studies. The Tasman Vaccine Laboratory collaborated with us in producing these bulk supplies.

Sporidesmin

Barely a year after the initial incrimination of *Pithomyces chartarum*, Dr E. P. White of Ruakura and Dr Synge succeeded in extracting from it in pure, crystalline form what we believe to be the toxin of facial eczema. This was named "Sporidesmin", the fungus at that time rejoicing in the name of "*Sporidesmium bakeri* Syd.". (Its chemical formula has been soundly established as $C_{18}H_{22}CL\ N_3O_6S_2$.)

This rapid progress was possible only because of Dr White's previous success in purifying extracts of toxic pasture. The same methods, applied to the fungus without the complication of interfering substances from grass, were eminently successful.

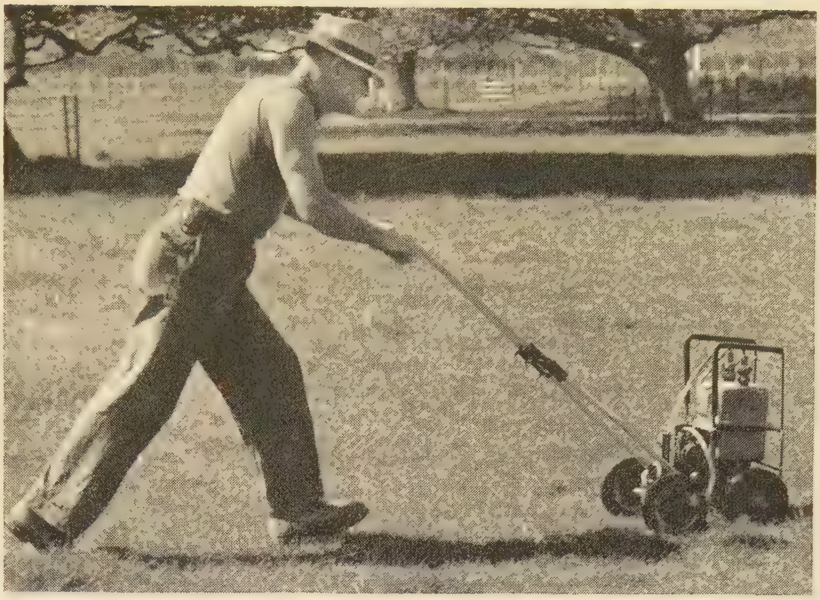
While the chemical composition of sporidesmin is thus known, its precise chemical structure is still the subject of study. Considerable progress has been made, but it is likely to be some time yet before the chemists are satisfied that they know the precise kind of material they are dealing with. This knowledge could be vital to possible development of a vaccine or of some chemical agent to protect animals from the effects of the poison.

Chemical tests for the presence of the toxin in fungal material have been developed. Some progress has been made in devising similar chemical tests for its presence in pasture. Both these will play a vital role in developing better control or preventive measures.

Pathology and Biochemistry

Up to this time knowledge of the pathology and biochemistry of the disease was limited to that gained by the study of field cases. The disease could not be produced experimentally, so that the whole process from the initial to the terminal stages was unknown. Field cases could be recognised only at relatively late stages of the disease, while no measurement of the amount of poison responsible for the effects observed could be made. There were always present in such cases the complications of other diseases.

The production of pure sporidesmin altered all this, and over the last 12 months a large number of careful experiments and observations have been made by P. H. Mortimer on both rabbits and sheep at Ruakura. Graded doses of the poison have been administered to these animals. They have been slaughtered and submitted to post-mortem examination at different times after the dosing. In addition, biochemical changes in blood constituents during the course of the disease have been studied.



Mobile spore trap used to take pasture sample for estimating spore numbers.

This work has given us a much sounder picture of the disease. The work confirmed that the clinical effects produced by sporidesmin are indistinguishable from those of facial eczema as it occurs in the field. The studies have resulted in the complete range of severity characteristic of naturally occurring field outbreaks being produced.

The most important new observation is that, far from being a poison which attacks only the liver, sporidesmin also affects other organs and tissues. Thus, it is responsible for characteristic lesions in the kidneys, in the adrenal glands, and in the bladders of dosed animals, as well as for the typical liver lesions of facial eczema damage.

It is also now clear that in addition to damage to the bile ducts of the liver, specific effects on the blood vessels of this organ are also evident, and that these may precede the bile duct inflammation.

The poison is capable of producing severe damage to the eye of the animal, and when injected it is responsible for severe local lesions at the site of injection.

Apart from these pathological effects, the dosing of animals with sporidesmin is quickly followed by scouring and loss of appetite. Liveweight losses naturally follow.

Studies of field cases of facial eczema and of animals in which the disease has been experimentally produced have shown that the blood sera transaminase and cholesterol levels are abnormally raised in affected animals. These two components of blood can be readily measured chemically, and the observation may permit us to develop a practical method of determining the severity of liver damage in an affected flock without slaughter. A. Taylor and J. Done, two of our Research Fellows, have been responsible for this work.

The practical value of such a development is obvious. In addition to the effect on blood, it has been found by the Fats Laboratory that there is a gross upset in the fat metabolism of the liver; the proportion of different fat lipids is markedly changed in affected animals. This finding is of importance to medical and veterinary science in study of the whole subject of liver diseases.

Immunology

Early in the new research the idea was put forward that it might be possible to develop a vaccine to protect animals against the effect of the facial eczema poison.

Much work has been done, but so far without success. Repeated trials by W. A. Te Punga at Wallaceville to demonstrate immunity after attempted vaccination with crude preparations of spores of fungus have given no indication that this approach will be fruitful.

Attempts to produce an artificial antigen by union of the toxin with some other chemical have also failed. This latter approach, which is the most likely to yield results, must await better understanding of the precise chemical structure of sporidesmin.

Field Control

While a great deal has thus been learnt, it must be stressed that no information has been obtained to alter

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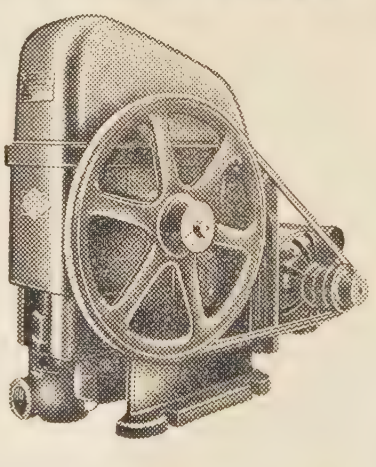

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the old basis of protection of sheep and cattle against the poison.

The only practical system still available is to prevent stock from taking in the poison with their food.

The removal of stock from pastures during dangerous periods, the use of safe crops as a feed alternative during these periods, or the shutting up of animals on silage and hay are still the only practicable methods we can recommend.

The new knowledge, however, should help us to make our predictions of danger periods more accurate. The spores are a rich source of the toxin. Animals probably ingest the poison by eating the spores. A knowledge, therefore, of the numbers of spores contaminating pasture over probable danger periods should be useful.

Spore Trap

P. J. Brook of the Plant Diseases Division has devised a mobile spore trap which, when used on suspect pastures, provides a rough guide to the amount of fungus present. Systematic use of this spore trap in only a few selected spots in the facial eczema zones provides a reasonable picture of the build-up in spore numbers after the winter and of any rapid increase with the approach of the danger period.

It is proposed, during the coming eczema season, to establish district spore trapping and counting services in seven areas, and to make the resulting information available to the existing facial eczema warning committees. This addition should at least help such committees to avoid "false alarms", since favourable facial eczema weather may occur without spore build-up to dangerous levels.

At the same time it is important to appreciate that spore trapping and counting and a picture of the trend in spore movements do not provide the whole answer to accurate prediction of dangerous or safe periods. We already know that the toxicity of spores varies widely and that a count that might be dangerous in one district may be safe in another.

What we really require is a method of collecting the spores in the field and of measuring their toxicity. Considerable progress toward this end has been made by J. D. Smith of Ruakura, and the method developed will get a good try-out next season. If successful, this method, which involves spore collection with a specially devised vacuum cleaner and testing of spores by chemical assay, will be adapted to wide scale use as quickly as possible.

FUTURE RESEARCH

Present plans involve continuation of the present types of study. First, we obviously need to know a great deal more about the behaviour of the fungus in the field. We need to investigate the possibility of modifying the micro-climate during the facial eczema season or before, so that the risk of rapid infestation of pasture by the fungus is reduced to a minimum. With this knowledge we may be able to devise pasture management methods which will provide escape mechanisms in the hands of efficient farmers.

We need to do still more work on the pathology of the disease, with particular reference to its sub-clinical effects. It is likely that doses of the toxin too small to produce clinical disease are yet harmful to the animal. They may lower its rate of growth and wool production or impair its reproductive efficiency. Appreciation of the profound effects of the poison on animal efficiency is necessary if only to convince the "powers that be" that the attack on facial eczema must be relentlessly pursued and that adequate funds and personnel for the purpose must be made available.

We need to know a lot more about the chemistry of the toxin for the reasons already given. It would be most helpful in the diagnosis of a dangerous pasture or a safe pasture to have available a quick chemical test which would allow us to say that a particular pasture contains the poison in dangerous quantities. We need this chemical knowledge particularly to make any advance in the direction of possible vaccine production or in the development of protective drugs, both of which might render elaborate managerial precautions unnecessary. It is along these lines that present workers are thinking.

Great Complexity of Research

It is only fair to the workers to emphasise the great complexity and difficulty of the research. The tie-up between a fungal toxin and a generalised disease of animals is a new concept in animal health. New approaches, new skills, a vast array of equipment, and many sleepless nights have gone into the work so far.

Its complexity increases rather than decreases and both time and highly efficient effort will be required in the solution of problems still veiled in mystery. Farmers anxious for rapid progress may be disappointed in this, but some day, somehow, with understanding support, facial eczema will be relegated to the status of an accepted and understandable hazard of grazing stock the easy prevention and control of which will be an accepted part of good farming.

☆

Potash Deficiency

THE free-draining soils derived from volcanic ash and occurring in the Waikato basin, the volcanic plateau, and most of Taranaki are generally associated with potash deficiency. Other soils of less extent also have this tendency.

The deficiency occurs not only because the soils are inherently low in potash, but because of certain management practices. A good hay or silage crop will remove the equivalent of about 1 cwt of muriate of potash per acre and continued use of the same paddocks without extra manuring will lead to a marked potash deficiency.

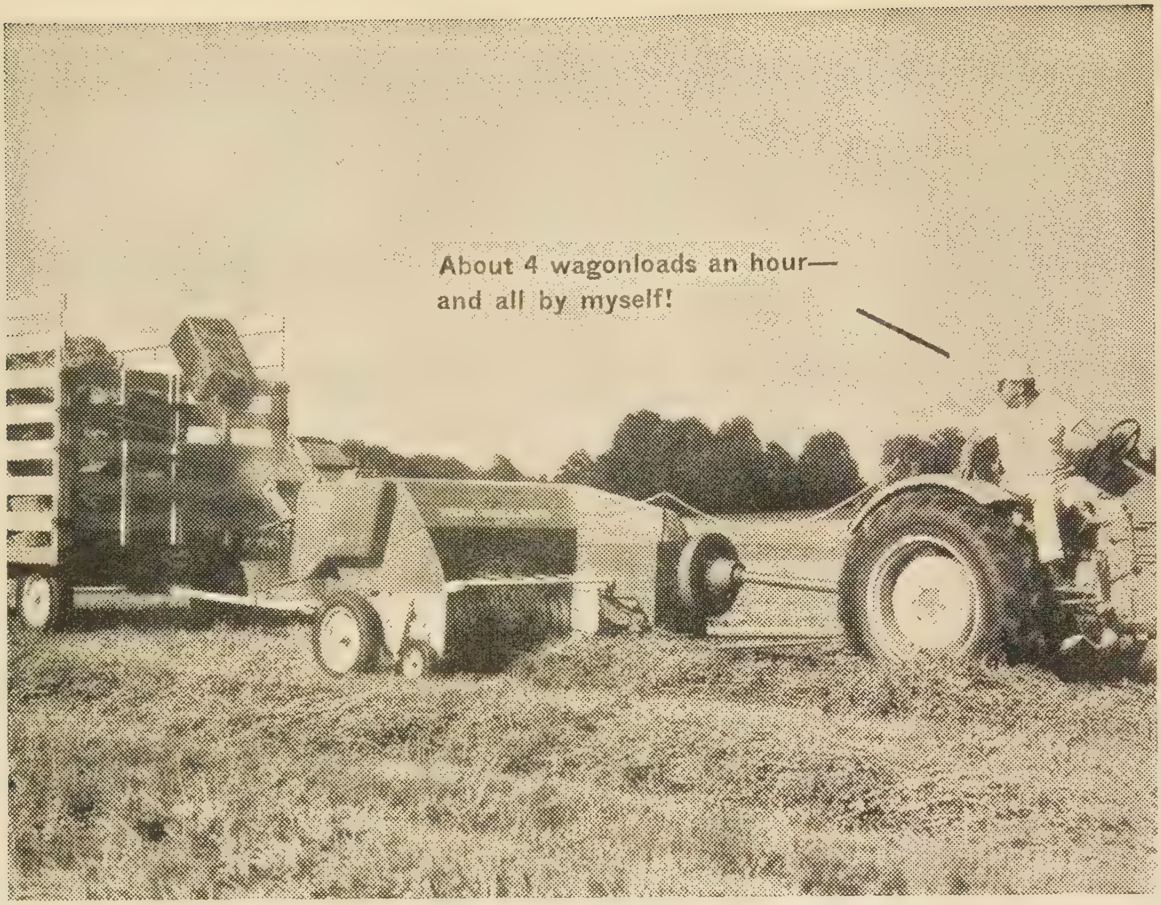
Pastures needing potash lack vigour, the clover plants being small and unthrifty. In severe cases the clover leaves show characteristic whitish spots, especially near the leaf margins. Because potash deficiency must be determined at an early stage, soil analyses by the Department can be of great help.

Where a pasture is seriously lacking in potash, initial application of the fertiliser will lead to a tremendous boost in white clover growth, though grasses will respond but little. At this stage bloat often becomes a problem. When the clover has built up the nitrogen level of the soil, grass growth will again take place and a balanced sward returns. Where the deficiency has been detected at an early stage the response to potash will be less unbalanced. The white clover response is still strong, but an immediate response of the grasses is seen.

Complete Utilisation Essential

As the cost of potash demands complete utilisation, care should be taken that the phosphate level of the paddock is always adequate and that good quality pasture species are present. For maximum returns potash should be applied when clovers can make full use of it and at a time of the year when the additional feed produced is most valuable. This usually means application in early autumn, late spring, or early summer.

—*B. R. HEDLEY,*
Fields Instructor,
Department of Agriculture,
Dargaville



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Revival of Interest in Wheat Growing in Wanganui - Waverley District

By A. A. DUNCAN,
Farm Advisory Officer, Department of Agriculture, Wanganui

FIFTY years ago cereal cropping was more or less standard farm practice on the flat and rolling volcanic loam soils of the Wanganui-Waverley district. Cereal growing, however, declined over the years and by 1940 there were no crops grown for grain. Over the last two or three years interest in cereal grain growing, particularly wheat growing, has revived and now the acreage, though not large, is rapidly increasing. In the 1959-60 season 400 acres of wheat were grown and in 1960-61, 800 acres.

THE wheat is all spring sown, either after a winter supplementary feed crop or directly after grass. The Australian variety Gabo is most commonly grown, but there is some Aotea and Tainui, but the last variety has not found favour owing to its proneness to lodging and its susceptibility to rust.

Gabo is a quick maturing wheat and can be sown at any time up to the middle of October. This gives the farmer the use of the paddock during the period of rather limited pasture growth in August and early September. From the middle of September onward there is usually adequate feed in the district and paddocks can be conveniently released from grazing.

Grass paddocks are usually ploughed up and fallowed for about a month before sowing. However, if the paddock selected for wheat is grazed down bare, which it normally is, there appears to be nothing against the practice of ploughing out of grass and working up one day and sowing wheat the next. A number of successful wheat crops have been grown in paddocks that have received this treatment. The soil is loamy, friable, and free draining and quickly works down into a good seed bed.

Weed Spraying Necessary

It is necessary to spray with hormone weedkillers to ensure weed-free crops. Weed growth is barely visible in the early stages of growth and some farmers have been influenced into not spraying because of the apparent absence of weeds. However, this mistake is usually made only once, because black nightshade (*Solanum nigrum*), fathen (*Chenopodium album*), and Prince of Wales feather (*Amaranthus retroflexus*) come in strongly and are a problem at harvesting. Weeds also reduce the yield of grain, because in addition to competing for moisture and nutrients they grow taller than the crop and have a smothering effect.

Gabo has the disadvantage that it is subject to sprouting in the ear if the weather is wet at harvesting. During the past season rust infection was fairly heavy on Gabo crops and reduced yields by 15 to 20 bushels per acre. Gabo crops are ready for harvesting from the middle of January onward.

The variety Aotea, if sown early, gives yields averaging 55 bushels to the acre; for best results it should be sown before the end of August. It stands well and is resistant to shaking. Aotea is two to three weeks later in maturing than Gabo and early sown crops are not usually ready for harvesting until the end of the first week in February.

The Australian variety Festival was tried in field trials in the district for the first time in the 1960-61 season and gave a useful yield. It matures in about the same time as Gabo, is of good baking quality, and stands well; it may prove a suitable variety for the district. It has considerable resistance to the strains of stem rust that are at present in the area.

Trials with Wheat Varieties

Two wheat variety trials have been carried out on the volcanic loam soils by the Farm Advisory Division with the cooperation of Taylor Bros., Westmere. The soil is classified as Westmere silt loam (66d on the soil survey maps). Brief details of these trials are as follows:

1958-59 season: Gabo and Aotea sown on 2 October 1958 were harvested on 30 January and 13 February 1959 respectively. Grain yield, which was limited by vigorous weed competition, was 46.4 bushels per acre of Gabo and 38.6 bushels of Aotea.

1960-61 season: Gabo, Aotea, and Festival were sown on 26 August 1960 and harvested on 12 February 1961. Gabo and Festival were ready about 19 January, but harvesting had to be postponed because of unsettled weather. Because of over maturity they lost through shaking an estimated 5 bushels of grain per acre. Stem rust developed to a moderate extent on Gabo and to a less extent on Aotea; Festival showed a trace. This trial was virtually weed free, having been sprayed with ¾ lb per acre of amine 2,4-D eight weeks after sowing. Aotea yielded 65.6 bushels per acre, Gabo 56.4 bushels, and Festival 55.4 bushels.

[D.S.I.R.

May prove a suitable wheat for the district: the Australian variety Festival.

Conclusion

The two main factors contributing to the revival of wheat growing in the Wanganui-Waverley district have been the introduction of improved wheat varieties and the efficient control of weeds by hormone weedkillers. Provided the wheat varieties maintain effective resistance to stem rust, the wheat acreage is likely to continue to rise. An indirect benefit from an increase in wheat growing is more pasture renewal, and pasture renewal is the key to increased stocking on flat country farms, especially where the farms are well developed and are adequately topdressed.

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1960 Survey of N.Z.'s Vineyards

By F. BERRYSMITH,
Horticultural Advisory Officer (Viticulture), Department of Agriculture, Auckland

IN the winter of 1960 the Horticulture Division made a survey of all the vineyards over half an acre throughout New Zealand. The survey was of special significance, because it was the first time in this country that the area occupied by each of the various grape varieties was recorded on a national scale. The Department of Agriculture plans to conduct a similar survey every five years to study changes in the varieties and their influence on the production of wine, table grapes, and grape juice.

THE Department's programme for assisting the viticultural industry has always included the importation, testing, and distribution of new grapes; thus the variety position is never static. The Department's latest importations, early this year, consisted of 36 new varieties and improved strains of grapes from France, Germany, and Switzerland.

Vineyard acreages were computed on the actual areas occupied by the vines, excluding headlands and other space involved in management, which on a general average would add about 25 per cent.

The survey, which covered 161 vineyards, showed that the total area planted in grapes in New Zealand was 958 acres with a further estimated 239 acres involved in working area.

Of the 958 acres planted 863 acres were in wine grapes, 72 acres in outdoor table grapes, and 23 acres were devoted to the production of grape juice (see graph and Table 1).

It was established that the most extensively planted outdoor grape was Albany Surprise, which occupied 145 acres. As about two-thirds of the Albany Surprise crop was sold as table grapes and used for grape juice, it was the main table and juicing variety.

Areas of Varieties

The leading wine grape was Baco 22A, which covered 107 acres, followed by Seibel 5455, 68 acres; Chasselas, 53 acres; Black Pinot, 52 acres; Palomino, 50 acres; Riesling Sylvaner, 45 acres; Seibel 4643, 43 acres; Gamay Gloriod, 34 acres; Pedro Ximines, 29 acres; Seibel 5437, 27 acres; Baco No. 1, 25 acres; Iona, 23 acres; Seibel 5409, 17 acres; Cabernet, 16 acres; Black Hamburgh, 15 acres; Malbec, 14 acres; Baco 2-11, 11 acres; White Muscat varieties, 11 acres; Niagara, 10 acres.

Minor varieties, below 10 acres, included Seibel 7053, 8½ acres; Pinot Gris, 7½ acres; Golden Queen, 7 acres; Semillon, 7 acres; Merlot, 6½ acres; Pinot Chardonnay, 6½ acres; Tokay,

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5 acres; Muscadine, 5½ acres; Gaillard Girerd 157, 8½ acres; Seibel 5163, 5 acres; Grenache, 4 acres; Oberlin 595, 4 acres; Cinsaut, 3 acres; and sundry.

Some vines were recorded only in their broad categories without variety names: White Vinifera, 9½ acres; Black Vinifera, 6½ acres; White Hybrid, 14 acres; Black Hybrid, 26 acres. Precise identification was not possible because the vines were dormant.

Auckland and Hawke's Bay Main Growing Areas

The vineyard areas of Auckland and Hawke's Bay, the two main grape growing districts, together comprised almost 85 per cent of the national total. Auckland with 425 acres had only about a 10 per cent lead on Hawke's Bay with 387 acres.

The variety pattern in these districts contrasted in a number of ways. Whereas Vinifera varieties comprised almost 64 per cent of the plantings in Hawke's Bay, they were barely 24 per cent of Auckland plantings. Because of the wetter climate in Auckland, the hardy disease- and weather-resistant hybrid varieties have proved far more economical than the Vinifera or Old World grapes.

The activity of the root-destroying phylloxera insect in Auckland has also been a factor favouring the planting of hybrids, as these possess some measure of resistance to this insect. In fact most of the earlier plantings were established on their own roots, but today most of the hybrids are grafted on to phylloxera resistant rootstocks. Up to the present Hawke's Bay has been free from the phylloxera insect and all the vines are ungrafted.

The main varieties grown in Auckland were Baco 22A, 87 acres; Albany Surprise, 59 acres; Seibel 5455, 47 acres; Palomino, 39 acres; Baco No. 1, 18 acres; Seibel 5437, 16 acres; Seibel 5409, 16 acres; Riesling Sylvaner, 13 acres; Baco 2-11, 11 acres; Niagara, 10 acres; Seibel 4643, 10 acres.

In Hawke's Bay the main varieties were Chasselas, 43 acres; Black Pinot, 35 acres; Seibel 4643, 33 acres; Pedro Ximines, 29 acres; Riesling Sylvaner, 29 acres; Gamay Gloriod, 27 acres; Iona, 20 acres; Baco 22A, 19 acres; Albany Surprise, 17 acres; Seibel 5455, 18 acres; Malbec, 13 acres; Cabernet, 11 acres.

The dominant variety in the other districts was Albany Surprise. In the Waikato, the main production area for outdoor table grapes, Albany Surprise occupied nearly 70 per cent of the plantings.

Most of the grapes in Hawke's Bay were grown in a few large vineyards, whereas in Auckland and elsewhere small vineyards accounted for most of the area. See Table 1.

1960 SURVEY OF N.Z. VINEYARDS

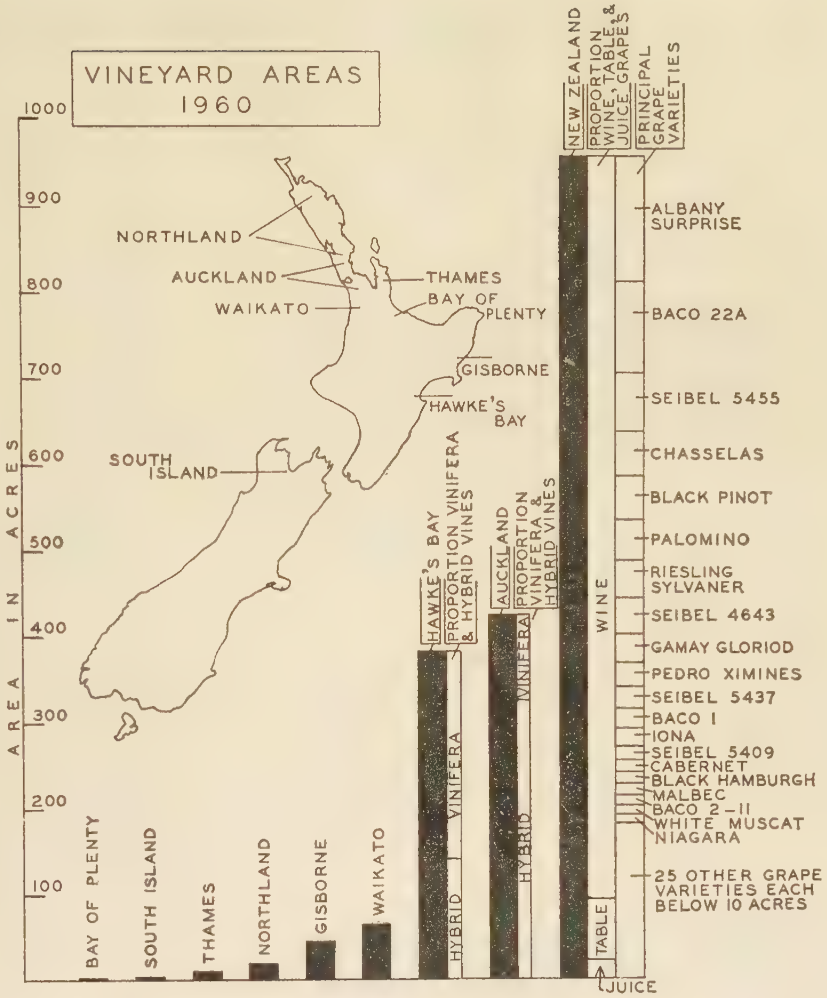

TABLE 2—SIZES OF VINEYARDS

District	Under 5 acres	5-10 acres	10-20 acres	20-30 acres	30-50 acres	50-100 acres	100-150 acres	Total vineyards
Northland	7	1	—	—	—	—	—	8
Auckland	76	9	4	—	2	—	1	92
Thames	2	1	—	—	—	—	—	3
Waikato	18	1	—	1	—	—	—	20
Bay of Plenty	2	—	—	—	—	—	—	2
Gisborne	15	2	—	—	—	—	—	17
Hawke's Bay	8	1	2	—	—	3	1	15
South Island	4	—	—	—	—	—	—	4
Totals	132	15	6	1	2	3	2	161

TABLE 1—PRODUCTION AND UTILISATION OF GRAPE CROPS

District	Number of growers	Wine acreage	Table acreage	Juice acreage	Total district acreages
Northland	8	19	2	—	21
Auckland	92	402	11	12	425
Thames	3	8½	1	½	10
Waikato	20	33	26	3½	62½
Bay of Plenty	2	2	1	—	3
Gisborne	17	31	14	—	45
Hawke's Bay	15	367	13½	6½	387
South Island	4	½	3¼	¼	4
Totals	161	863	71¾	22¾	957½

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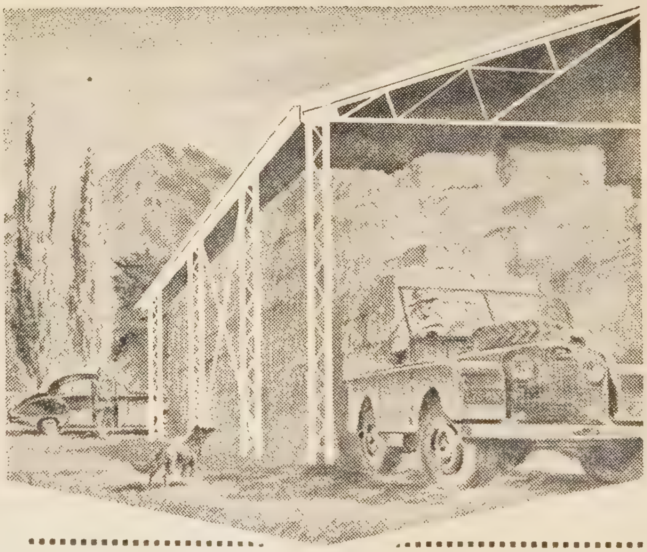

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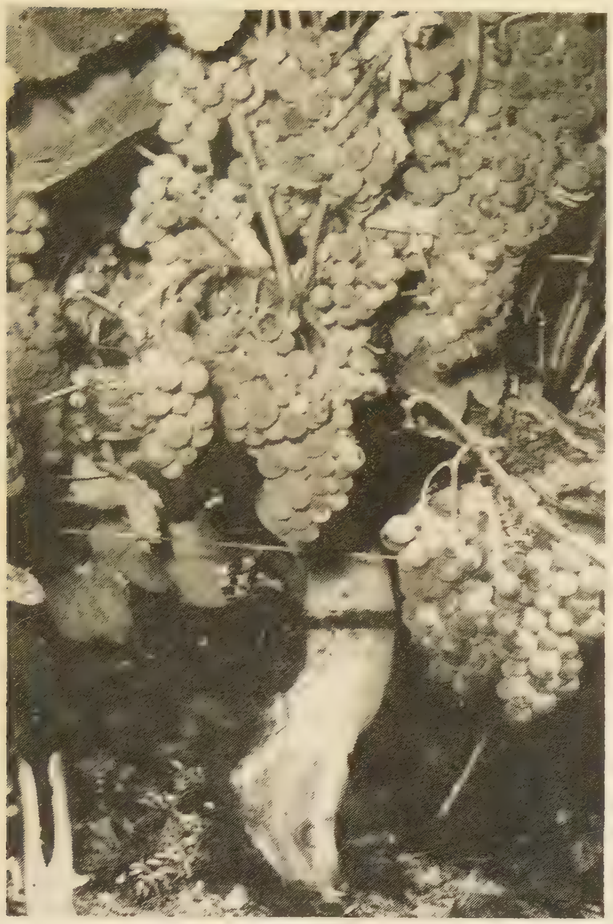


[*Sparrow*

▲ The survey showed that Baco 22A was the leading wine grape in New Zealand, being planted on 107 acres last year.

← Albany Surprise was the most extensively planted outdoor grape and the main table and juicing variety, occupying 145 acres last year.

TABLE 3—YOUNG VINES (1 to 4 years): ACREAGE AND PERCENTAGE OF DISTRICT TOTALS

Districts	Vinifera		Hybrid		Totals	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
Northland	1.5	7.1	1.0	4.8	2.5	11.9
Auckland	19.0	4.4	42.0	9.9	61.0	14.3
Thames	1.5	15.0	0.5	5.0	2.0	20.0
Waikato	4.0	6.4	5.0	8.0	9.0	14.4
Bay of Plenty ..	—	—	—	—	—	—
Gisborne	11.5	25.5	3.5	7.8	15.0	33.3
Hawke's Bay	32.0	8.2	20.5	5.3	52.5	13.5
South Island	—	—	0.1	—	0.1	—
Totals	69.5	—	72.6	—	142.1	—
Percentage of national total	—	7.2	—	7.6	—	14.8

The survey also took into account two broad age groupings on the vines—young immature vines aged one to four years and mature vines aged five years and over. Young vines divided into Vinifera and hybrid varieties and expressed as a percentage of the district totals are shown in Table 3.

The ratio of Vinifera to hybrid varieties in recent plantings in the Auckland and Hawke's Bay districts generally followed the established trends, though it was apparent that the hybrids were becoming more popular in Hawke's Bay.

The general assessment in Table 3 shows that nearly equal areas of hybrid and Vinifera vines were planted in recent years. Altogether, young vines amounted to 142 acres or about 15 per cent of the total vineyard area. When these young vines come into full bearing the additional wine could impose some pressure on the market.

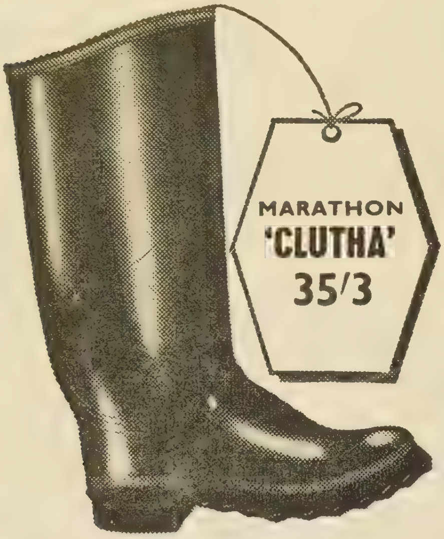
Rapid Expansion of Industry

Mainly as a result of import restrictions the viticultural industry has expanded rapidly since the Second World War, the acreage in wine grapes having more than doubled since 1945. With imported wines reduced to a modicum and with no foreseeable prospects of exporting wine, future expansion is expected to be more gradual. There appears, however, to be considerable scope for further plantings with good varieties for the production of table grapes and grape juice.

In 1960 grape wine production was estimated at 918,300 gallons.

The area in glasshouse grapes in 1960 was estimated at 439,000 sq. ft., which produced about 200 tons of dessert grapes. The main centres of glasshouse grape growing were Auckland, 215,100 sq. ft.; Canterbury, 54,150 sq. ft.; Manawatu, 53,700 sq. ft.; and Oamaru, 43,700 sq. ft.

Though the viticultural industry in New Zealand has advanced a long way since the first vines were planted by Samuel Marsden about 1818, there are many promising possibilities for the future if the best viticultural practices are pursued.


MARATHON
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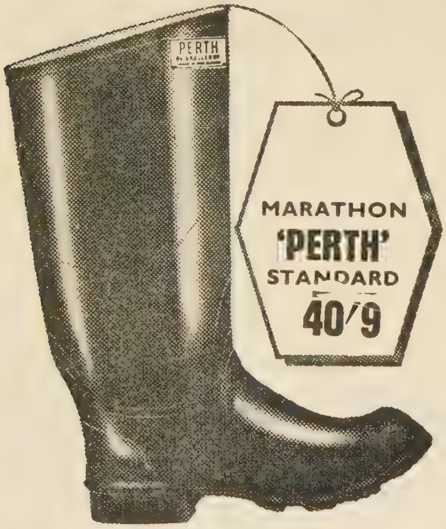
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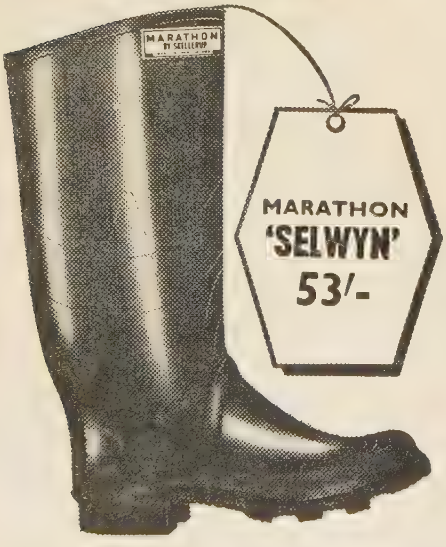
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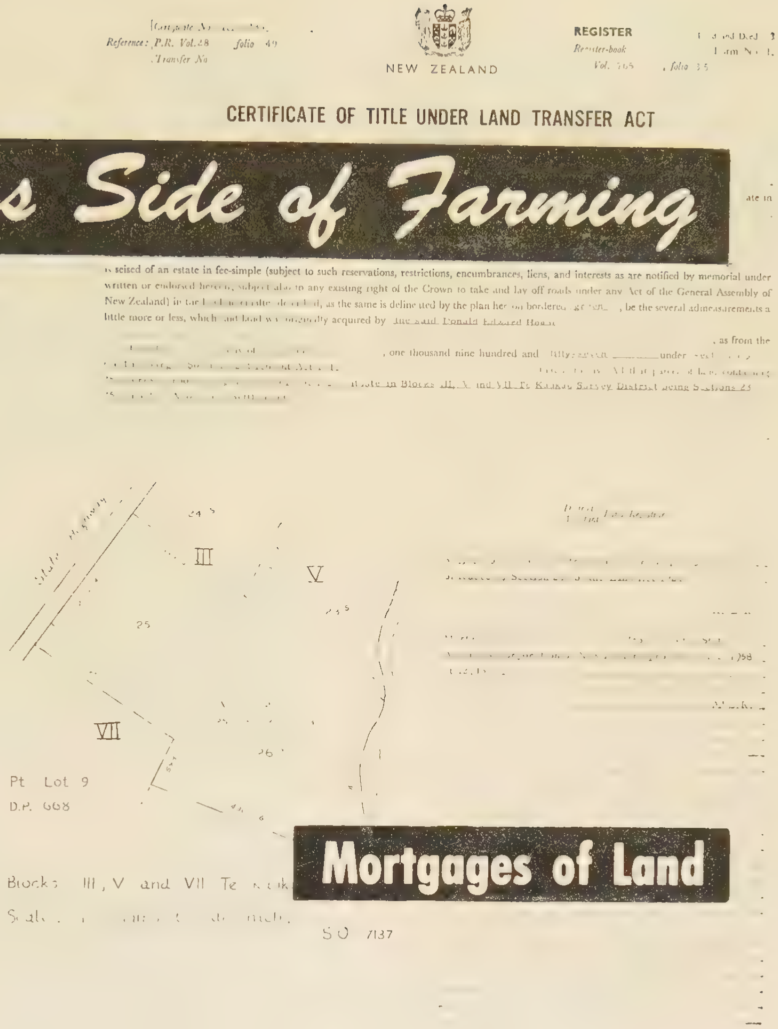
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is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial under written or endorsed hereon, subject also to any existing right of the Crown to take and lay off roads under any Act of the General Assembly of New Zealand) in the land [illegible], as the same is delineated by the plan hereon bordered [illegible], be the several admeasurements a little more or less, which said land was originally acquired by [illegible]

, as from the [illegible], one thousand nine hundred and [illegible] under [illegible]

Mortgages of Land

By N. R. WOODS,
Farm Advisory Officer (Economics),
Department of Agriculture,
Dunedin

FOR the year ended 31 March 1960 some 10,600 mortgages amounting to £41½ million were registered against farm land in New Zealand. Some of the money was needed to buy farm land; for development projects, new buildings, increased livestock; in fact, for all the activities on the farm which require more ready cash than the farmer has. Though mortgages of land are a very important aspect of farming, it is surprising how little the average mortgagor knows about the rights and obligations in his mortgage, which are outlined in this article.

What Is a Mortgage of Land?

FOR a mortgage to come into existence there must be:

1. A borrower or mortgagor as he is called in legal parlance.
2. A lender or mortgagee.
3. Usually a sum of money which is being borrowed.
4. Land pledged as security for the loan.

The Mortgagor

The most important obligation of the mortgagor is, of course, to repay the interest and principal of his loan according to the terms of the mortgage. Though he does not have to account to the lender for the way in which he is using the property and profits, unless the security for the mortgage is jeopardised, he must keep all buildings on the land insured and in good repair. He must also pay all rents, rates, etc. If he fails and the mortgagee has to pay them, the borrower is liable not only for the payments themselves and interest on them, but for any additional expenses incurred by the mortgagee.

A person under the age of 21 cannot mortgage property without the approval of a Magistrate. No mortgage can be made irredeemable or even for an unreasonably long period (except debentures issued by a company), and the borrower can redeem or pay off his loan any time before the stipulated date provided he pays interest for the unexpired term of the mortgage, or for such shorter period as the mortgagee may agree to take. Of course when the mortgage expires the mortgagor is entitled to repay the money and obtain a discharge of the mortgage.

The mortgagor can even redeem after the due date provided he repays interest and principal in full before the property is actually sold up, even if the mortgagee has taken possession of the property. If the mortgagee has begun to take action to sell the property, the mortgagor will also have to meet any costs the mortgagee has incurred.

The Mortgagee

The rights and obligations of the lender or mortgagee are just as important as those of the borrower.

The mortgagee is generally entitled to custody of the title deeds for the property; he can assign (transfer) his interest to some other person if he wishes to or he can sub-mortgage, when he himself becomes a mortgagor.

If the mortgagor falls behind in his repayments or otherwise breaks the mortgage agreement, the remedies generally available to the mortgagee range from being able to sue the mortgagor to the right to take possession of the property and sell it up.

The Sum of Money Borrowed

The security margin insisted on by all lending institutions is in the interests of both lender and borrower.

The Land Given as Security

An important feature of mortgages of land under the New Zealand land transfer system is that such mortgages do not give the mortgagee ownership of the land in question, even though he usually takes possession of the title deeds. In other words, the land still belongs to the borrower.

In general, any land may be mortgaged, except where there are restrictions on its alienation (where the owner is not free to dispose of it).

Costs of Preparing Mortgages

The cost of preparing mortgage documents and their registration by the mortgagee's solicitor are borne by the mortgagor. The New Zealand Law Society's scale charge for the mortgagee's solicitor varies according to the amount of the mortgage. For instance for a mortgage of £5,000 the solicitor's costs are £40 8s. 6d. and for £10,000, £68 11s. In addition there is the stamp duty, registration fee, and agency charges, which will cost about £4. If the mortgagor has his own solicitor, he will also have to meet his fees (half the scale charge of the mortgagee's solicitor).

A farmer requiring information on any specific point of a mortgage should consult his legal adviser.

Acknowledgment

Acknowledgment is made to the General Manager, State Advances Corporation, for help in the preparation of this article.

Speeding up Haymaking

FOR many the forage harvester has turned the haymaking period from days to hours, but most farmers do not yet own, or have access to, a flail type harvester; yet they have perfectly good conventional haymaking equipment.

Last season it was shown at the Northern Wairoa Demonstration Farm that the saying "Hay in a day" could still be made valid by constant use of the tedder from mowing until baling.

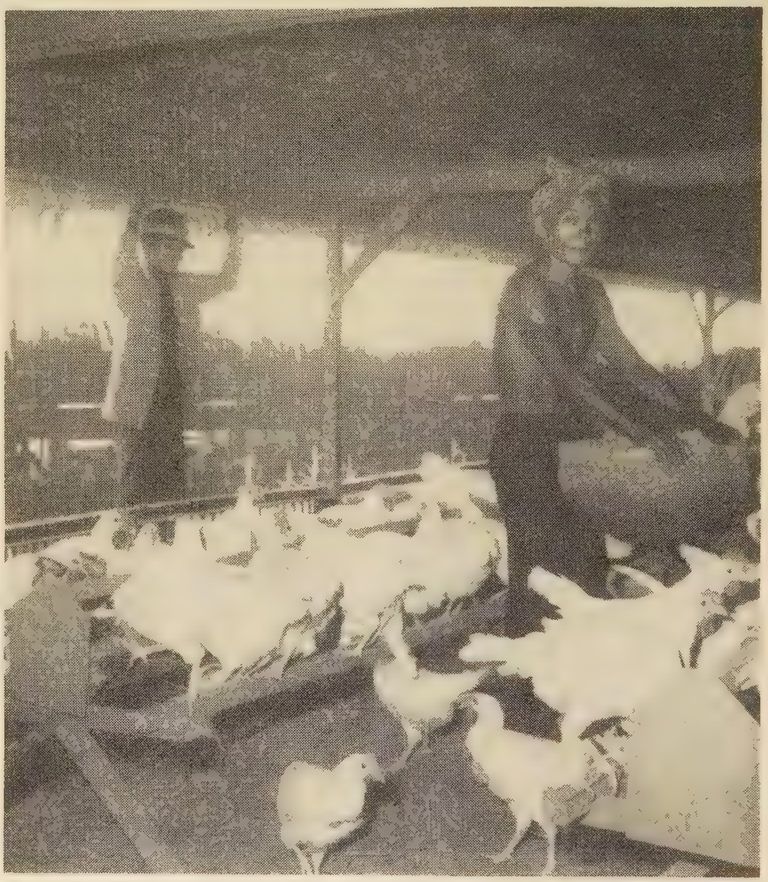
In small paddocks one tedder or rake is sufficient, provided it starts three or four rows behind the mower and keeps the grass moving as much as possible. Where more than 6 acres are being cut, two tedders or rakes are advantageous for speed.

The quick drying prevents the clover leaves and more tender grasses being lost on the ground from over-drying and gives a much more valuable and palatable baled product.

—*B. T. JORDAN,*

Farm Advisory Officer,
Department of Agriculture,
Dargaville

Freedom - from - Hunger Campaign



Feeding of ready-to-lay pullets on a poultry farm in Cambodia.

LACK of proteins is a contributor to human malnutrition in tropical and sub-tropical countries. Eggs and poultry meat are rich in protein and other important nutrients and poultry flocks can be raised quickly without high capital investment.

An FAO technical expert helped the Government of Cambodia set up a national poultry improvement scheme in 1957 which has resulted in raising egg output in the country by 50 per cent and decreasing poultry mortality by one-third.

Cambodian staff were trained in modern techniques of poultry production and demonstration centres were established where trials were carried out in improved management, feeding, and breeding methods.

Seeding Rates for Swedes and Turnips in Relation to Size of Seed

APART from relatively small areas on high fertility land it is not now customary to thin swede crops by hand hoe to give them reasonable growing room. Rather, the object is to endeavour to establish a crop of regularly spaced plants by adjusting the seeding rate. This applies more particularly to ridged crops. Many of these crops are not as good as they might be simply because plants are unduly crowded and their development is adversely affected as a consequence.

DURING recent years there has been a tendency to reduce the seeding rate, and today for ridged swede crops it varies from 2½ oz to 14 oz per acre with a more general rate of 6 oz to 8 oz depending on fertility and size of bulb desired. The accompanying information on the numbers of viable seeds per ounce in lines of Government-approved turnip and swede seeds being distributed in 1961, apart from being of interest, will help to predetermine the density of plants that could be expected from a given rate of seeding. Over much of the lighter land three or four plants per foot of row would meet requirements; on land capable of growing a 40-ton crop two plants per foot of row are adequate.

The following may help in determining the rate of seeding to be adopted.

Distance of drills apart		Lineal feet per acre	Plants per acre when spaced 4 in. apart in rows	Amount of seed to sow at 10,000 viable seeds per ounce
in.				oz
7	..	74,670	224,010	22.4
24	..	21,780	65,340	6.5
26	..	20,103	60,309	6.0

The above sowing rates need to be increased or decreased according to whether the number of viable seeds for the particular variety is below or above 10,000 per ounce. An allowance would also be necessary to provide for adverse sowing conditions and for insect pests that regularly destroy seedlings before the crop is safely established.

The total number of swedes per ounce in the different varieties of swede seed ranges from 8,800 to 11,700. Other published figures give an average swede count of from 11,500 to 13,250 per ounce, so that the Government-approved seed being distributed would appear to be well above average in size. This seed should give even distribution through the seeders of the ridging machines, provided they are in reasonably good order.

With turnips, size of seed is not so important, particularly when the crop is sown broadcast.

It must be stressed that the figures of the numbers of viable seeds per ounce of the different varieties apply specifically to distributions of Government-approved seed being made in 1961 and have no application to any other lines of seed.

NUMBERS OF VIABLE SEEDS PER OUNCE IN GOVERNMENT-APPROVED SWEDE AND TURNIP SEEDS DISTRIBUTED IN 1961

Variety	No. of viable seeds per oz
SWEDES	
Wilhelmsburger	10,000 to 11,000
Sensation (Yellow fleshed)	
Wye	
Doon Spartan	
Grandmaster	8,000 to 9,000
Crimson King	
Calder	
Doon Major	
Superlative	7,750
YELLOW-FLESHED TURNIPS	
Green Top Yellow ..	13,000 to 14,000
Green Resistant	
Purple Resistant	
Waite's Eclipse	
Champion Hybrid ..	
Purple Top Yellow ..	12,000
WHITE-FLESHED TURNIPS	
Red Globe	14,000 to 15,000
York Globe	
Green Globe	12,500
Purple Globe	11,000

—*J. O. WALLACE,*

Seed Production Officer,
Department of Agriculture,
Dunedin

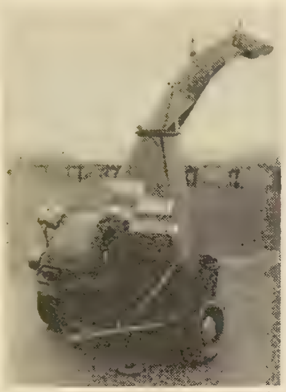
Government-approved Turnip and Swede Seeds

GOVERNMENT-APPROVED seed of the usual range of varieties of turnips and swedes is again being distributed for sowing in the 1961-62 season. The varieties are named elsewhere on this page, and were also discussed in the October 1959 "Journal". A limited quantity of seed of each of two new swede varieties (Doon Major and Doon Spartan) bred in Scotland is also being distributed. These varieties have been subjected to numerous block sowings arranged by the Department, and the results justify wider sowings which must, however, be restricted by the amount of seed available.

The practice of preparing each year one blend of each variety of Government-approved seed for distribution throughout New Zealand has been continued. As usual the seed is packeted in 1 lb and 2 lb calico bags labelled "Government Approved" and carrying a departmental overstamp.

Except in two varieties the Government-approved seed being distributed in 1961 has a germination of 90 per cent or better. Seed of Superlative swede and of Purple Top Yellow turnip has a germination of 88 per cent.

If seed of any variety from an earlier distribution is still available from retailers, a sample should be subjected to a fresh germination test before sale.



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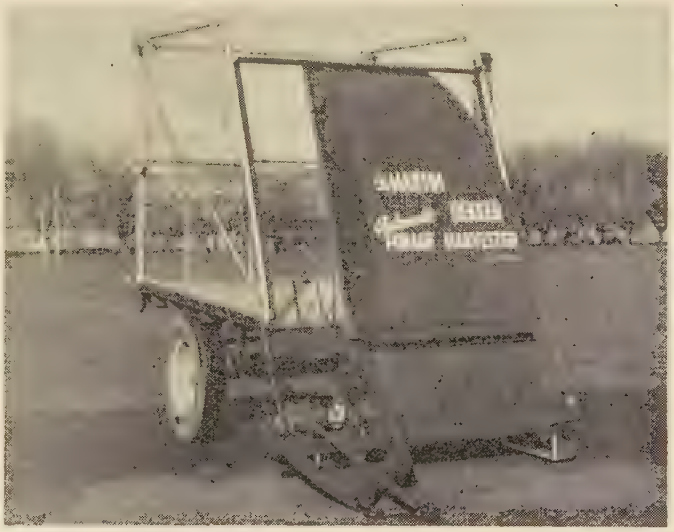

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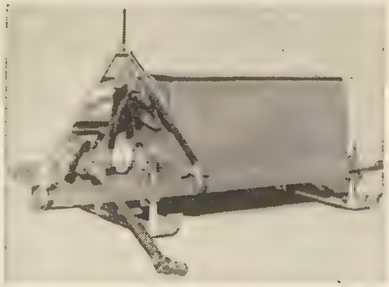

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SWINE FEVER: Strict Compliance with Garbage Feeding Regulations Important

THERE has been an outbreak of swine fever in Australia. In this article the Animal Industry Division gives information about the disease and a brief account of past outbreaks in New Zealand. The precautions taken to prevent the entry of this disease into New Zealand are described and the importance of compliance with the garbage feeding regulations as a means to maintaining security against the disease is stressed.

SWINE fever is a highly contagious disease of the pig caused by a virus. The disease, which is generally fatal, is entirely peculiar to the pig. Not only is it never seen naturally in any other animal, but all attempts to transmit it experimentally have failed. Man is not affected and there is no danger even in eating pork infected with the disease.

The virus which causes swine fever cannot be seen with a microscope and is so minute that it will pass through the pores of the finest bacteriological filter. The length of time the virus retains its potency has an important bearing on spread and control of the disease. As in other virus diseases the virulence of the virus varies in different outbreaks.

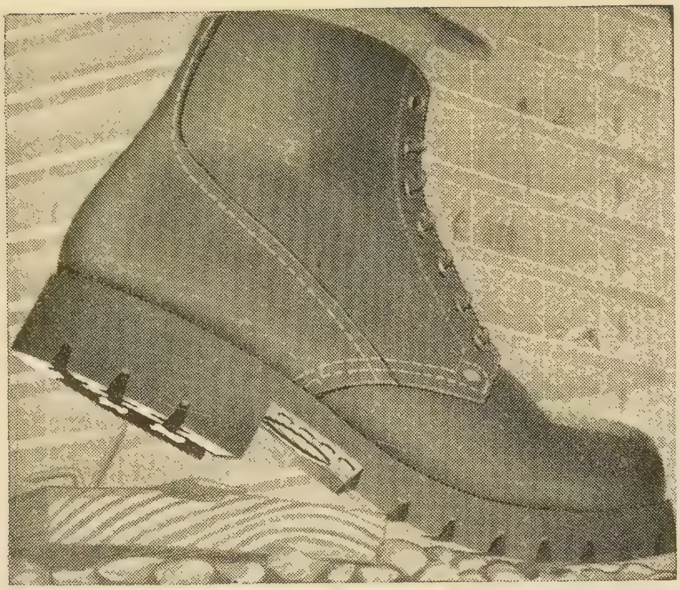
It is generally considered that the infection does not persist long on premises where an outbreak has occurred, though cold temperatures prolong it. An American authority states that it will survive throughout the winter.

Experiments in the United Kingdom showed that the virus remained potent for at least 73 days in the bone marrow of salted and chilled carcasses and 37 days in the bone marrow and muscle of smoked bacon. The practical importance of this lies in the fact that it shows how the disease can be spread by feeding to pigs scraps of bacon or pork from carcasses of pigs killed when infected but not yet showing symptoms. Such scraps are contained in garbage.

It is generally considered that the period between infection and the appearance of symptoms is from three to 10 days, but it can extend to as long as seven weeks. Thorough boiling destroys the infection, and garbage that has been boiled for an hour is quite safe to feed to pigs.

When an outbreak occurs, infection is spread by contact of healthy pigs with infected animals, through the dung and urine, which is highly infectious, through infected litter and premises, and by the swallowing of infected material. Infection can be carried on boots and clothing of people attending pigs. Birds, dogs, and other

Firemen supervising the burning of infected piggery buildings during the 1933 outbreak of swine fever in the Wellington area.



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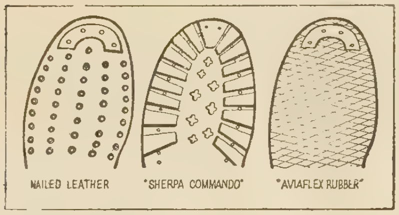
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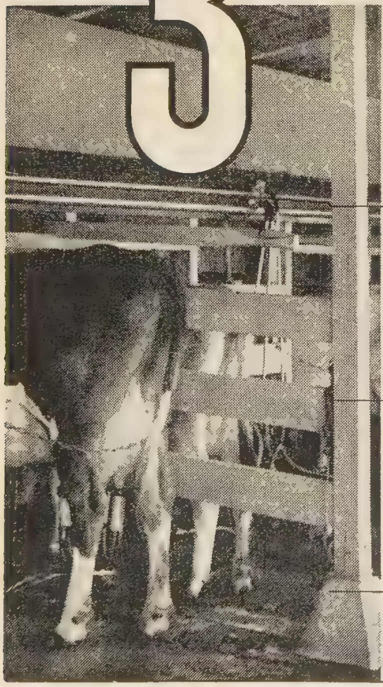

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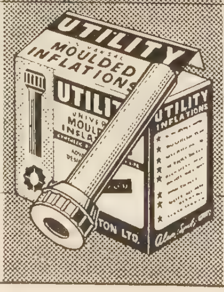
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animals can also convey the infection from place to place.

Symptoms

In the acute form of the disease symptoms may give very short notice of the onset. A pig eating well in the morning may be dead by the afternoon. Usually, however, affected animals refuse food, shiver, and tend to lie in a corner of the sty. There is often a catarrhal discharge from the eyes, the eyelids being glued together. The temperature is high (up to 108 degrees F). Scouring and discolouration of the ears, abdomen, and inside of the thighs may occur. Pigs gradually become comatose, are prostrated, and die after an illness of two to four days.

In sub-acute cases the illness is much longer than in the acute type. There is a rise in temperature to as high as 107 degrees followed by prostration, shivering, and loss of appetite. Inco-ordination of the hindquarters causes a drunken, swaying gait when the animal is forced to move. There is also a yellowish or greyish foetid scour, sometimes containing clots of blood, which can be easily seen on the floor of the pen. There is usually a diffuse reddening of the skin on the belly and ears, or a rather extensive spotted appearance, due to hemorrhages under the skin.

Lack of response to treatment by antibiotics, sulphonamides, nitrofurizone, or furozolidone usually first draws attention to the serious nature of the outbreak.

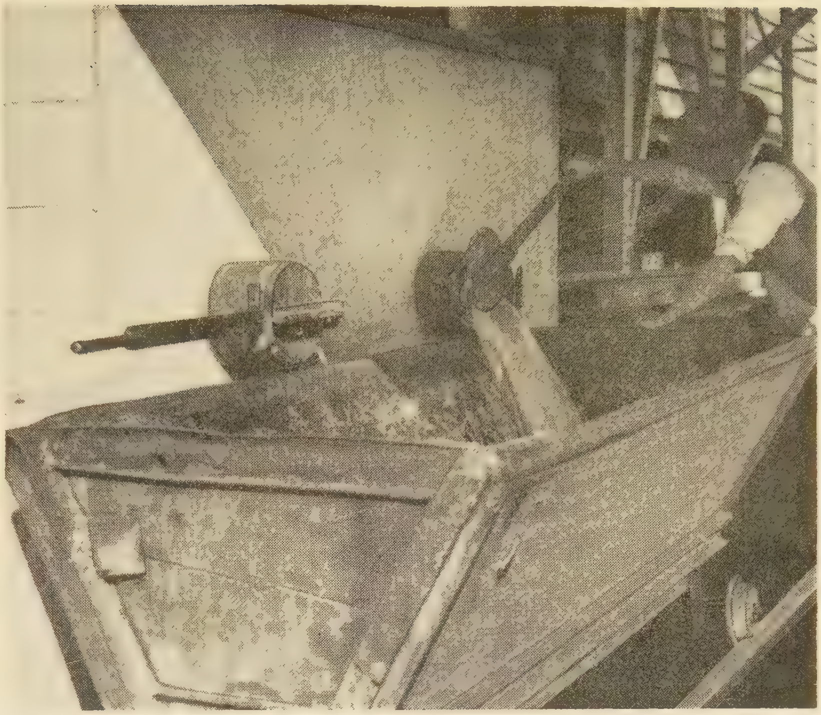
Outbreaks in Australia and New Zealand

The present outbreak in Australia is the first since that of 1941-42. New Zealand has been free from swine fever since 1953, when an outbreak occurred in the Auckland district. Before this there had been no outbreak since one in the Wellington area in 1933.

Swine fever is always present (endemic) in Europe, the United Kingdom, America, and Africa. In the United Kingdom it is controlled by vaccination, though up to the present this has not been compulsory and as a result the disease has not yet been eradicated.

The disease has been known in Europe for over 120 years and is said to have reached America, where it is known as hog cholera, in 1833. The first reference to it in veterinary books was in the United Kingdom in 1858. A particularly virulent strain in Africa, commonly known as African swine fever, has recently reached Spain, where it is causing considerable trouble, as it cannot be controlled by vaccination.

The only way in which swine fever can occur in Australia or New Zealand is by infection brought in from overseas.



Handling cooked garbage. Regulations insist on the proper cooking of garbage as a safeguard against introduction of disease through raw garbage.

The origin of the present outbreak in Australia has not yet been traced, but it started in piggeries in which garbage or swill was fed to pigs. The previous outbreak in Australia (1941-42) and both the outbreaks in New Zealand (1953 and 1933) were traced to infected pork scraps in garbage from overseas ships that was fed to pigs without being boiled.

Safeguards

To guard against this, no food scraps or food of any sort from any ship or overseas aircraft is allowed to be used for any purpose in New Zealand. This material is collected and destroyed at all overseas ports and airports and part of the duties of Department of Agriculture quarantine officers, assisted by Customs officers, is to see that this is done. Exactly the same measures are used in Australia. However, as the present outbreak in Australia and the one in New Zealand in 1953 demonstrate, they are not completely effective.

An additional safeguard is regulations under the Stock Act governing the feeding of garbage to pigs. These state that any person wishing to collect garbage to feed pigs **must obtain a permit from the Department of Agriculture before beginning operations.**

This permit is granted only if the applicant has a cooking plant capable of raising all the garbage collected to a temperature of 212 degrees F and maintaining it at that temperature for an hour, and that the area in which the garbage is cooked and stored before cooking is either fenced off or constructed in such a way that it is inaccessible to pigs.

Even if infected material got into the country, it still would not cause an outbreak of swine fever unless it was fed to pigs without being properly boiled or pigs had access to it before it was treated.

Today Australia is very close to New Zealand. Aircraft can cross the Tasman in 2½ hours and the latest ships in 48 hours. If there is an outbreak of swine fever in a piggery, all pigs on the property are destroyed and if it is not possible to disinfect the buildings used for pigs, these are burnt. No pigs may be kept on the property until it has been declared clean.

Owing to the present outbreak, 5,000 pigs have already been slaughtered in Australia and many more may be affected. During the 1941-42 outbreak there, over 10,000 pigs were destroyed before the disease was eradicated.

These facts show how necessary it is for every possible precaution to be taken to prevent swine fever gaining a foothold in New Zealand.

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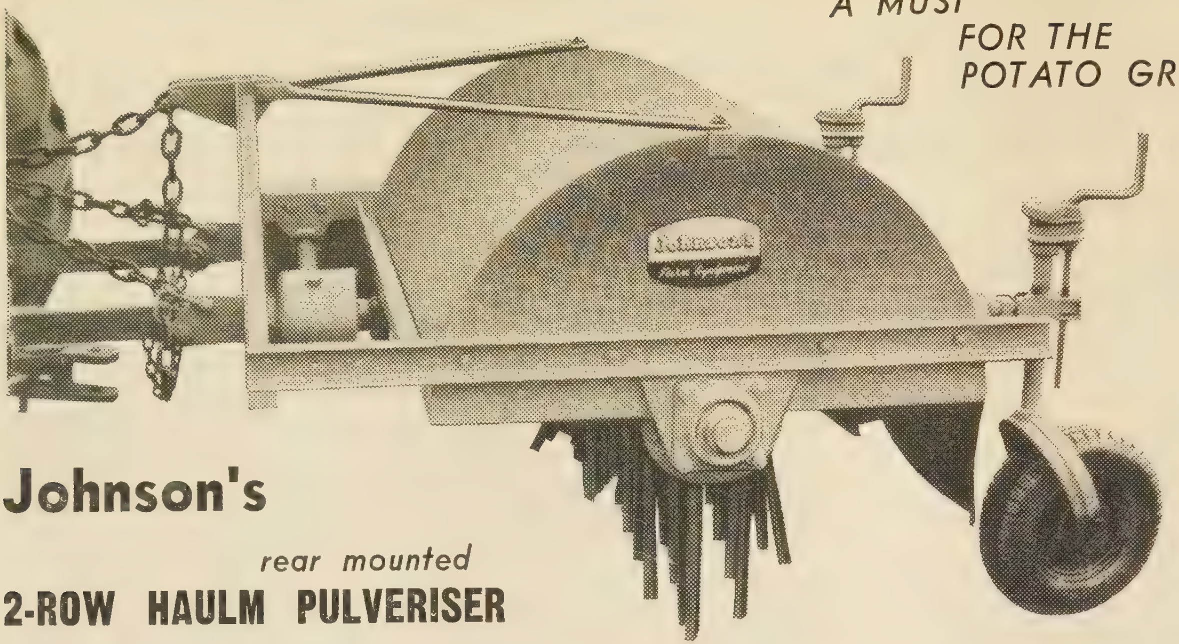

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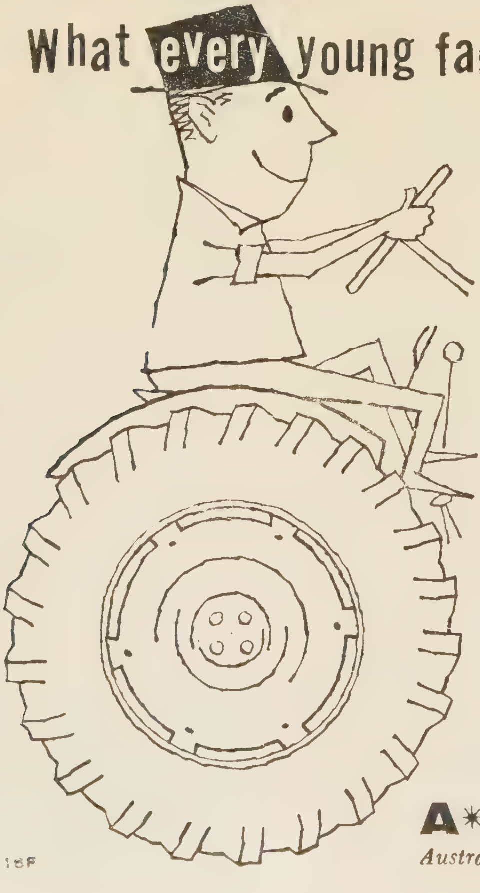
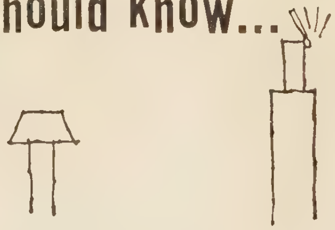
What every young farmer should know...





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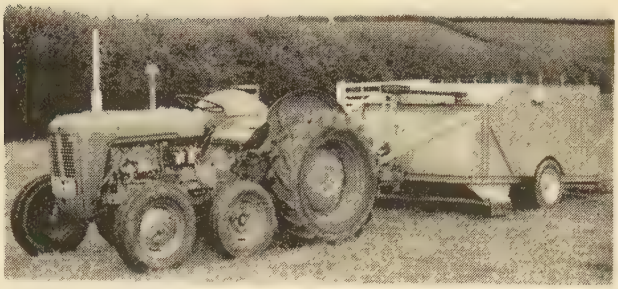
ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture and Department of Scientific and Industrial Research Trials and Experiments



The commercial litter collector used at Rukuhia to investigate the removal of litter from pasture as a possible means of control of facial eczema.

Ruakura

Influence of Sex on Lamb Carcass Quality Early Ruakura experiments have shown that non-castrated lambs had faster growth rates, heavier carcass weights, and slightly better conformation than wether or ewe lambs, but under existing grading systems were judged inferior because of lack of fat finish and "coarseness". The present-day consumer preference for more muscle and less fat, the greater emphasis on light weight ranges, and the premium payment for early lambs underline the need for further investigation on the influence of sex on carcass quality, body composition, growth rate, and the efficiency of food utilisation. For this purpose several further experiments have been designed at Ruakura.

In the first trial ram lambs are being castrated and ewe lambs spayed at four weeks of age. Thereafter groups of control and treated lambs will be killed at four-weekly intervals up to 24 weeks of age. This will not only give a series of liveweight graph curves, but from carcass dissection and chemical analysis, provide information on body composition changes at different ages due to sex. A second experiment will study the effect of castration at different ages to determine when the removal of gonadal hormones takes its effect on growth rate and body composition.

Rukuhia

Facial Eczema Research A commercial litter collector which is essentially a large tractor - operated vacuum cleaner has been used at Rukuhia Soil Research Station to investigate the removal of litter from pasture as a possible method for control of facial eczema. Litter was removed at a rate of 60 lb per acre. The fungus which causes facial eczema grows mainly on dead or dying plant material, and the rate of collection suggests that systematic treatment of pastures in this way may remove enough litter to reduce toxic levels substantially.

Enough spores have been taken up with the litter collected with the machine to suggest that their removal might also aid in control, and this will be investigated in further trials planned for next year.

Animal Ecology Division

Dispersal of Seeds by Blackbirds Information obtained by Animal Ecology Division on the food and movements of blackbirds throws new light on the economic importance of this species, which is abundant in gardens and orchards and also occurs deep in native forests.

Examination of stomach contents showed that on a yearly basis 43 per cent of the birds' food consisted of animal matter including a number of harmful insects; the remaining food was mostly berries.

Droppings from blackbirds in a forest area were planted in sterile soil and yielded many seedlings of native plants such as poroporo and karamu. Thus, apart from causing damage to ripe fruit, blackbirds consume harmful insects and distribute the seeds of plants with fleshy fruits.

The importance of blackbirds in seed dispersal is due to their abundance and movements as well as to their diet. Banding showed that at least 70 different blackbirds visited a half-acre suburban garden in Lower Hutt in the course of a year. The young birds moved distances of up to three miles, but the adults rarely went more than a few hundred yards.

Because of their numbers and the extent of their movements blackbirds, with their diet including a wide variety of berries, are important agents in seed dispersal. The birds may be troublesome in distributing the seeds of weeds on farm land but beneficial in assisting the re-establishment of native plants in protection forests that have been damaged by opossums or deer.

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BROWNTOP, YORKSHIRE FOG AND
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SHELL

Mechanical Lift for Supers during Honey Extraction

By C. R. PATERSON,
Apiculturist,
Department of Agriculture,
Hamilton

MACHINES and equipment now available can be adapted to ease the heavy lifting in commercial honey production. Initial installation costs may appear high, but such aids can prevent many a sore back or strained heart.

DURING recent visits several American authorities on beekeeping said that research stations in U.S.A. were successfully trying to mechanise work in both the apiary and the honey house. A mechanical lift to keep supers during extraction at a convenient working level was mentioned on several occasions.

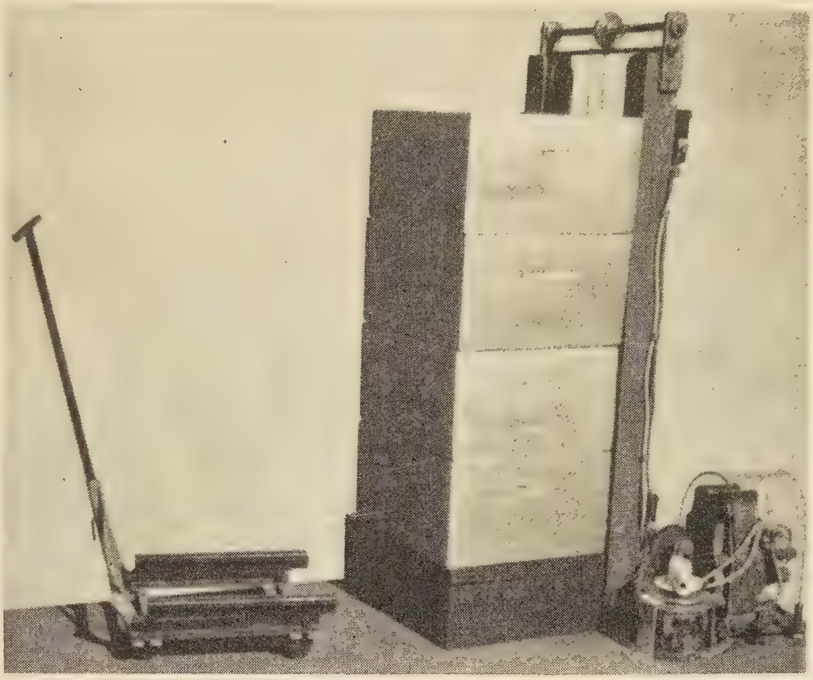
Machines of this type are available here but most are designed for workshop or warehouse use. A quarter-scale working model was therefore made to see just what was entailed in construction and the practicability of adapting other lifting methods. Already a manually operated barrow on pneumatic tyres is available to beekeepers. What is required is to motorise a similar unit in a fixed position.

Construction Details of Electric Model

Two upright lengths of channel iron are fixed to feet which should be long enough to give stability when the lift is at its highest point. Suitable cross-stays at top and bottom keep the channels evenly spaced so that the lift runs up and down smoothly in them.

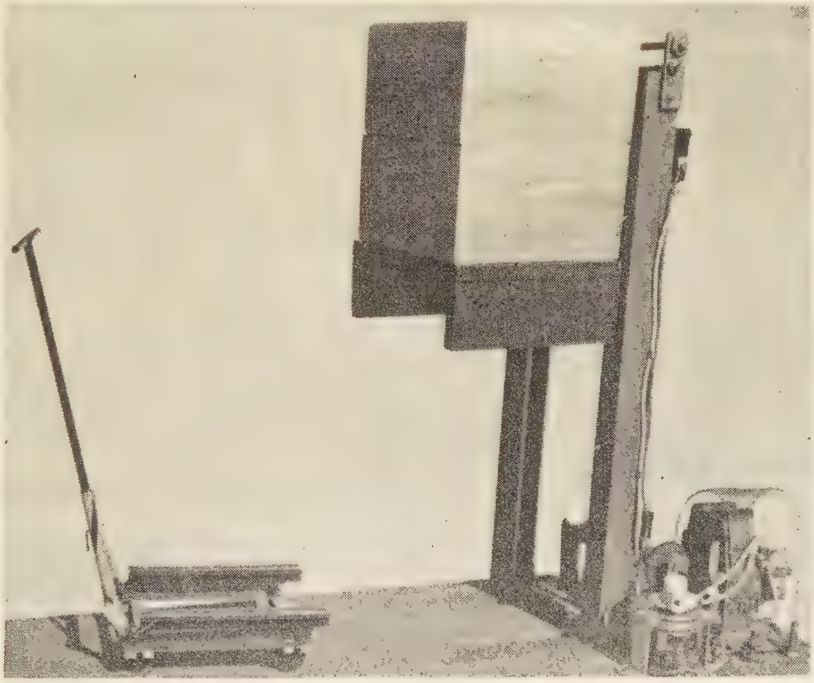
The lift or hoist component is a rectangular or square frame made of smaller channel iron. The outside width of this should be about ½ in. less than the inside dimensions of the two uprights. To ensure that this framework slides smoothly up and down with the minimum effort, eight small rollers (four on each side) are placed close to the corners. The rollers should be made strong enough to carry the load.

On the lower edge of this frame are fixed the two prongs which will lift the supers of honey. Some consideration should be given to the positioning of these prongs to allow proper use of the hand barrow in shifting stacked supers from warming room to extractor.



Above—Electric lift, showing four supers in position and type of hand truck used.

Below—Last two supers brought up to suitable working position.



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THE MILKER'S HANDS
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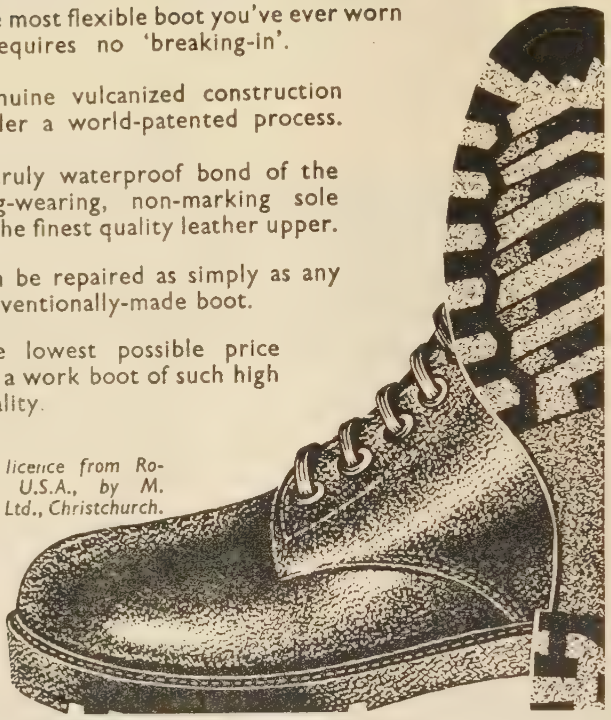

P6

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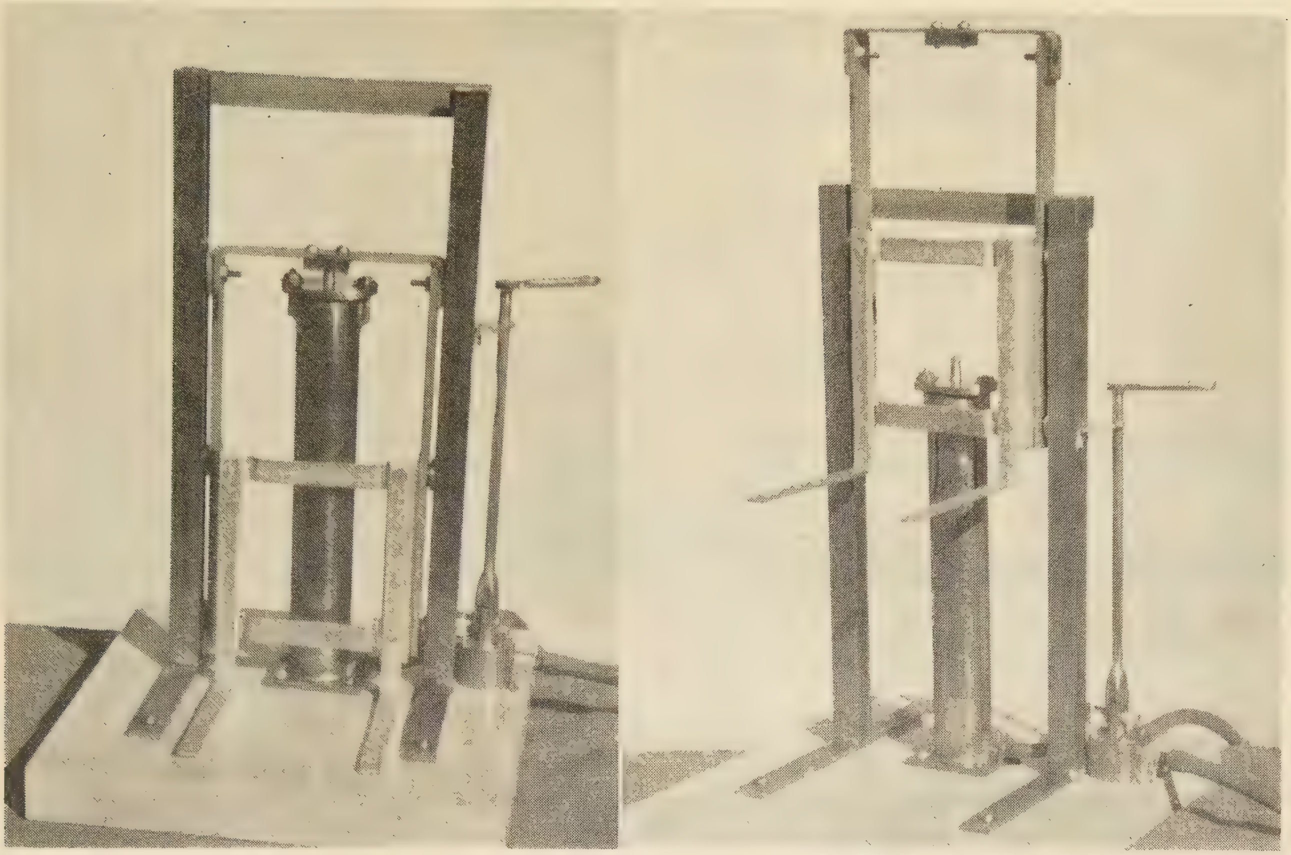
M4/8

MECHANICAL LIFT FOR SUPERS DURING HONEY EXTRACTION



▲ Hydraulic lift in down position (left) and up position (right).

The power unit would be a ½ h.p. electric motor and suitable worm-type reduction gear. This needs to be robust, as it has to take the load and act as a brake to position the lift at any level. Some of the older washing machines had very suitable parts that could be used.

A drum made from a short piece of 3 in. or 4 in. pipe is used for winding the hoist up or down. To give greater lifting power and help reduce the speed of lift, the winding cable is fixed to a point at the top of the two large uprights; it then goes down to a loose pulley on the sliding framework of the hoist, then up and over another loose pulley on the top, then down to the winding drum.

Electrical Fittings

To enable the hoist to function for the benefit of the beekeeper it is necessary to have a reversing switch for the electric motor. This allows for the drive up or down. It is also necessary to have two cut-out switches which are operated by the moving framework.

When the hoist reaches the top the power is automatically cut off. When the motor switch is moved to "down" the hoist is lowered and the power switched off automatically when ground level is reached.

A lead screw similar to that on a large lathe can be used instead of a winding system. The screw can be rotated by a geared electric motor and the driven nut fixed to the hoist component. Or the lead screw can be fixed with the nut driven by the motor; the driving unit would then go up and down with the hoist.

Method of Operation

The supers of honey ready for extraction are placed, usually four high, on suitable pallets. A pile is wheeled in and placed on the hoist. This will naturally be in a convenient position for the person doing the uncapping. Usually the first two supers on this pile of four are at a convenient level for the operation. To get the combs out of the last two a considerable amount of bending is required. To overcome this, the switch is flicked on and the supers come up into the position of the first two. There is no need to hold on to the switch, as the hoist automatically stops when it comes to the top. If an intermediate position is required, the main switch will have to be used and cut off at the appropriate time.

Though a hoist of this type was designed primarily to save back bending, it appears to help speed up uncapping, and it might also be valuable for those who wish to have their extractor on a raised platform. This is sometimes preferable to having a well in the floor to hold the strainer or pumping unit.

Another Method of Applying Power

Mr L. Baker of Gordonton decided to try water power and developed a machine which has now given satisfactory service for two seasons. The following information has been kindly supplied by Mr Baker.

The machine will lift four supers of honey. The uncapping stand is about 9 in. above floor level so that the lifting of supers during uncapping is a great advantage.

The water is from a household pressure pump unit producing a pressure of 55 to 60 lb per square inch. The cylinder has a 3 in. bore. Apparently this can be obtained in various lengths and is specially made for pump cylinders.

For each lift 3½ pints of water are used, so that if 60 supers were extracted the total needed would be just over 6½ gallons.

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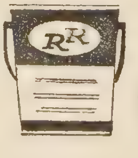

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Actually the lift is never required to raise the whole four supers, as two are usually emptied before the remaining two are brought up to work level. This takes five seconds.

There appears to be no need for an automatic cut-off, as once the lift reaches the top it is prevented from going any further by suitable stops. However, it is best to use the control lever and cut the water off at the appropriate time.

An overflow pipe is needed at the very top of the cylinder to allow any water that may have passed the washer or piston to escape.

Retraction Difficulty

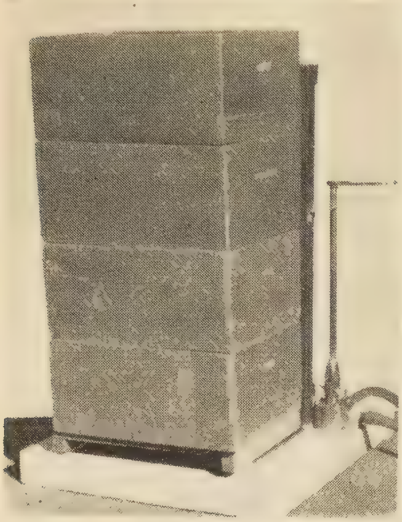
As there is practically no weight on the lift for the downward trip, there was some difficulty in getting it to go down of its own accord. The size of the discharge pipe will control the rate of drop. However, it was found necessary to trim the back of the washer slightly so that friction was reduced. This was done on a grinder and seemed to give the desired results. The trimmed washer is shown in the diagrams on this page. However, it would be wise to try the piston first before treating it in this way.

Separate levers controlled the up and down movements. With this set-up it was possible to have both levers at the open position at the same time with the result that water could be wasted.

In an endeavour to overcome some of these minor faults a model lift was made to show that alterations could be effected. This model is shown in the photographs and described in the drawing. It is not considered necessary to give minute details, as each machine will be made to suit the individual requirements of the beekeeper.

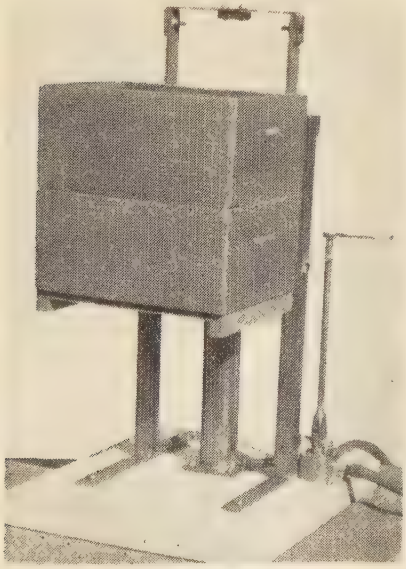
A 4 in. cylinder could be used for lower water pressures, but more water would be used at each lift and the cost of the cylinder would be much greater. Mr Baker's unit cost £28 10s.

If beekeepers require further information, they can arrange with the local Apiary Instructor for a demonstration of the models described.

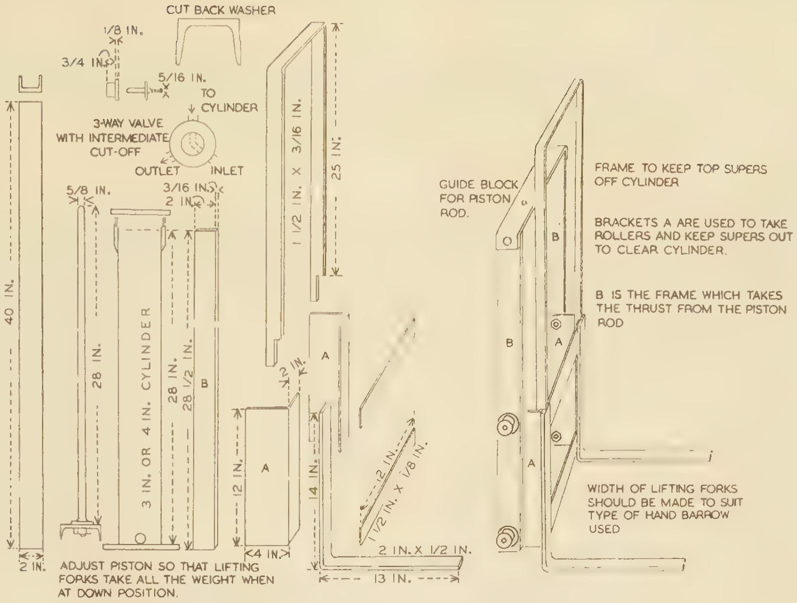


▲ Hydraulic lift with supers ready for uncapping.

▼ After two supers have been done the lift brings the remaining two to a convenient working level.



MECHANICAL LIFT FOR SUPERS



ADJUST PISTON SO THAT LIFTING FORKS TAKE ALL THE WEIGHT WHEN AT DOWN POSITION.

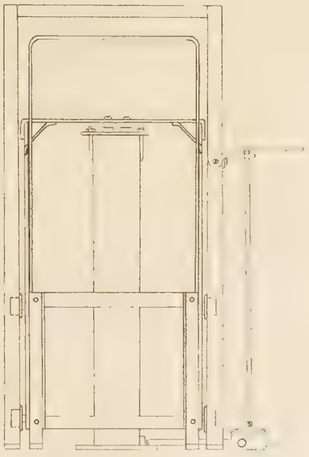
FRAME TO KEEP TOP SUPERS OFF CYLINDER

BRACKETS A ARE USED TO TAKE ROLLERS AND KEEP SUPERS OUT TO CLEAR CYLINDER.

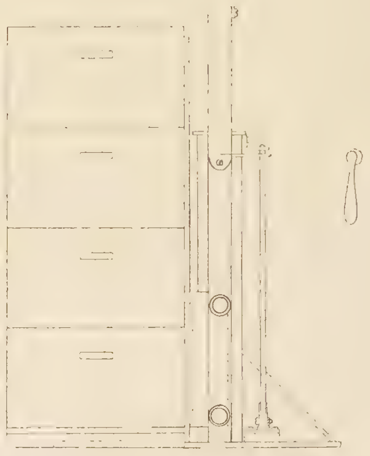
B IS THE FRAME WHICH TAKES THE THRUST FROM THE PISTON ROD

WIDTH OF LIFTING FORKS SHOULD BE MADE TO SUIT TYPE OF HAND BARROW USED

DETAILS OF HYDRAULIC LIFT



FRONT ELEVATION



SIDE ELEVATION

Town Supply Herds Certified Clear of Reactors to Tuberculin Test

DURING July the following town milk suppliers were issued by the Department of Agriculture with clear herd certificates declaring that their herds are free of reactors to a tuberculin test.

To qualify for a clear herd certificate a supplier's herd must have no reactors to a tuberculin test of the whole herd. A herd comprises all cattle over six months of age depastured or kept on one property and includes dry or other stock from the property temporarily on a run-off. Where two or more herds share a common run-off all the herds using it have to be tested before any of them can qualify for clear herd certification.

In the list below the figures after each supplier's name and address are the number of the animals tested and these are followed by the date of the test.

These herds will be recorded in the New Zealand Register of Clear Herds, compiled by the Department of Agriculture.

ALEXANDER, S., Ranfurly St., Dannevirke, 166, 24/7/61
ANDERSON, J. and J. A., Waiareka Valley, 17 C.R.D., Oamaru, 55, 26/6/61
ARCHER, P., No. 10 R.D., Palmerston North, 53, 27/2/61 and 25/7/61
ATKINS, S. F., McDonald Rd., Levin, 85, 10/7/61
BAIN, J., Washdyke, 70, 11/7/61
BEATTIE, W. J., No. 1 R.D., Outram, 52, 11/7/61
BENTON, R. R., 55 Smart Rd., New Plymouth, 85, 30/6/61
BIRD, C. W., Kukutauaki Rd., R.D., Levin, 62, 7/6/61
BROWN, M. A., No. 4 R.D., Glen-Iti, 30, 10/7/61
BRUCE, L. E., Maheno, No. 9 D.R.D., Oamaru, 25, 24/6/61
CANTERBURY AGRICULTURAL COLLEGE, Lincoln, 146, 18/7/61
CLARIDGE, E. R., Mosston Rd., Wanganui, 14, 17/7/61
CLARK, C. P., Leadley's Rd., No. 2 R.D., Christchurch, 42, 23/7/61
CLARKE, W. J., Lowcliffe, No. 3 R.D., Ashburton, 102, 29/6/61
COCHRANE, A. K., R.D., Runciman, 116, 26/6/61
COURT, R. T., Halswell P.O., Halswell, 23, 30/6/61
COXON, A. T. S., Chester Rd., Carterton, 105, 28/7/61
DENTON, L., R.D., Hawarden, 62, 5/6/61
DEPARTMENT OF HEALTH, Tokanui Hospital, Te Awamutu, 166, 24/2/61
DICKIE, I. J., No. 1 R.D., Edendale, 56, 17/7/61
DODGE, H. L., Fernside, R.D., Rangiora, 75, 4/7/61
DODGE, J. R., Ohoka, R.D., Kaiapoi, 80, 10/7/61
DOWNING, J. W., Waikari, 2, 18/6/61
DOWNS, W. I., Paparimu, R.D., Papakura, 57, 18/7/61
DUFF, E. G., Kiaora, No. 18 D.R.D., Oamaru, 23, 26/6/61
ELLETT, T. R., Ihumatao Rd., Mangere, 187, 26/6/61
ELPHICK, E. E., Estate of, c/o E. M. Southcombe, P.O. Box 41, Otaki Railway, 35, 26/6/61
FAUCHELLE, I. D., Whites Rd., Brookby, 63, 3/7/61
FERGUSON, J. H., Ohoka, R.D., Rangiora, 61, 11/7/61
FLETCHER, J. G., Ohoka, R.D., Kaiapoi, 39, 10/7/61
FORD, R. K., and SON, No. 5 R.D., Palmerston North, 88, 12/6/61
GOODWIN, W. D., Swamp Rd., Carterton, 116, 20/6/61
GOONAN, J. J., Hikutaia, 93, 18/7/61
GRAY, W. M., Patutahi, P.B., Gisborne, 90, 31/7/61
GREENSIDE, Mrs I. E., Paparangi, Johnsonville, 40, 23/6/61
GWILLIAM, C. M., Paerata, 81, 6/7/61
HAGGLOW, H. A. and N., 150 Mairehau Rd., Marshlands, 41, 16/6/61
HARVEY, C. B., 487 Main North Rd., Kaiapoi, 48, 23/6/61
HASTINGS, H., Cameron Rd. Sth., Greerton, Tauranga, 75, 17/7/61
HATCHARD, H. O., Greenpark, No. 4 R.D., Christchurch, 10, 23/6/61
HOBSON FARMS LTD., No. 2 Farm, Wharepapa, 142, 20/6/61
HOLLAND, A. A., No. 3 Line, Wanganui, 62, 4/7/61
HOLMES, H. H., Hobsonville Rd., 2 R.D., Kumeu, 54, 20/7/61
HUNT, D. H., East Rd., Clevedon, 65, 18/7/61
ISBISTER, S. D., Ardgowan, 1 B.D.R.D., Oamaru, 43, 7/7/61
JENSEN, E. J., P.O. Box 25, Otaki Railway, 79, 18/7/61
JOHNSON, J. A. and R. A., Ohoka, R.D., Kaiapoi, 75, 21/7/61
JONES, A. L., Ihumatao Rd., Mangere, 92, 18/7/61
KATIKATI MILK SUPPLY LTD., Busbys Rd., Katikati, 127, 25/7/61
KEDDIE, A .R., Johnston St., Tinwald, 11, 15/6/61
KEVEY, A. N., Brookby Rd., Manurewa, 37, 20/6/61
KING, W. G., Ladbrooks, No. 2 R.D., Christchurch, 60, 9/6/61
LEECH BROS., Smarts Rd., R.M.D., Waikuku, 28, 21/7/61
LEVIN CO-OP. DAIRY CO. LTD., Queen St. East, Levin, 72, 17/7/61
LOVELL, E. W., Colville Rd., Dargaville, 31, 11/7/61
McDONALD, P., P.O. Box 17, Kaitangata, 70, 27/6/61
McFADDEN, A. D. and D. G., 32 Walters Rd., Christchurch, 57, 16/6/61
McGAVESTON, H. T., R.D., Te Horo, 56, 18/7/61
McINTYRE, I. A., P.O. Box 18, Fordell, 247, 29/6/61
McKENZIE, R. B., Ngakuru, 1 R.D., Rotorua, 228, 17/7/61
MacKENZIE, R. H., Broadfields, No. 4 R.D., Christchurch, 50, 16/6/61
McLEAN, C., C. J., and Mrs C., 102 Ridge Rd., Howick, 73, 10/7/61
McNEIL, C. A., Coromandel, 66, 19/7/61
MAITLAND, S. B., Tuhimata Rd., Paerata, 59, 4/7/61
MANNEX, B. J., Tayforth, No. 4 R.D., Wanganui, 54, 24/7/61
MARSHALL, H. L., Tararua Rd., No. 2 R.D., Levin, 77, 9/7/61
MATTOCK, L. G., Hurford Rd., Omata, 113, 3/7/61
MEADOWS, D. L., Springston, No. 4 R.D., Christchurch, 75, 6/7/61
MICHAEL, J. R., Taitapu, Christchurch, 49, 27/6/61
MORRIS, A. R., Waikuku, R.D., Rangiora, 83, 27/6/61
MOULD, C. W., Smaills Beach, Dunedin, 66, 27/6/61
MUDGE, W. G., Soldiers Rd., Ohau, 88, 27/6/61
MULDREW, W. H., Maheno, No. 9 D.R.D., Oamaru, 41, 24/6/61
NOLAN, F. M. and M. E., Ladbrooks, No. 2 R.D., Christchurch, 26, 12/6/61
PAGEL, J. R. C., Hamilton Bay, Port Chalmers, 55, 17/7/61
PARSONS, J. W., Eiffelton, No. 4 R.D., Ashburton, 75, 9/6/61
PATCHING, Mrs K. H., Ohau P.O., Victoria Rd., Ohau, 55, 27/6/61
PETRIE, J. A., and SON, Waikuku, R.D., Rangiora, 61, 3/7/61
REYNOLDS, L. J., 1 R.D., Hamilton, 395, 30/6/61
RICKERBY, R. J., Springston, No. 4 R.D., Christchurch, 26, 21/7/61
RIDER, R. T. J., Ardmore, R.D., Papakura, 41, 10/7/61
ROBERTS, E. F., Cherry's Rd., Pakuranga, 101, 11/7/61
ROBERTSON, J. W., Purekanui, R.D., Port Chalmers, 46, 3/7/61
ROWE, S. K., Ohariu Valley, Johnsonville, 20, 29/6/61
SADD, A. E., LTD., (No. 2 Farm), Grovetown, Blenheim, 142, 10/7/61
SANDERSON BROS., Jesmond Rd., Drury, 126, 10/7/61
SAUNDERS, J. W., Trices Rd., Halswell, 24, 3/7/61
SCHNELL, R. N., No. 10 R.D., Palmerston North, 97, 21/6/61
SHAW, T. E., Baverstock Rd., East Tamaki, 20, 27/6/61
SMITH, J. G. and N. J., No. 1 R.D., Edendale, 54, 17/7/61
SMYLIE, A. C., Kaitoke, 25, 29/6/61
STANDEN, I. C. and Mrs D. L., P.O. Box 2, Waikanae, 91, 14/7/61
STEWART, J. D. and J. T., Waiau Pa., R.D., Patumahoe, 106, 10/7/61
STEWART, R. W., Wakari Rd., Dunedin, 41, 11/7/61
STOKES, E. F., Waikuku, R.D., Rangiora, 131, 26/6/61
STRATHEONA TRAINING SCHOOL, Pleasant Point, 4, 4/7/61
SYMES, P. F., Milnes Rd., Halswell, Christchurch, 34, 26/6/61
TATE, D. J., P.O. Box 74, Manakau, 75, 26/6/61
TAYLOR, M. K., Wallace Rd., R.D., Ihakara, 70, 10/7/61
TEASDALE, T. J., Akatarawa, Upper Hutt, 62, 16/5/61
THOMAS, M. C., 1 R.D., Hamilton, 93, 28/7/61
TOBECK, G. S., Greenpark, No. 4 R.D., Christchurch, 59, 23/6/61
TOPHAM, B., Hunua, 73, 11/7/61
TULLOCK, G., Manaia Rd., Masterton, 62, 7/7/61
TWADDLE, T. B., Enfield, No. 1 C.R.D., Oamaru, 28, 27/6/61
VAUGHAN, G. W., No. 1 Herd, Te Ngae Rd., Rotorua, 84, 18/7/61
VAUGHAN, G. W., No. 2 Herd, Te Ngae Rd., Rotorua, 84, 18/7/61
WALKER, C., and SONS, Beach Rd., Te Horo, 131, 17/7/61
WATSON, T. E., Mosston Rd., Wanganui, 18, 17/7/61
WATT, R. H., P.O. Box 32, Oamaru, 30, 7/7/61
WATTS, I. D., Clarkville, R.D., Kaiapoi, 26, 10/7/61
WERDER, E. G., Taiporohenui, Hawera, 142, 11/7/61
WHEELER, L. O., Days Rd., Springston, No. 4 R.D., Christchurch, 64, 11/7/61
WINIATA, J., P.O. Box 31, Te Horo, 60, 11/7/61
WOOD, A. G., Karaka, R.D., Runciman, 53, 5/6/61
WOODING, G. S., Cameron Rd., Wanganui, 33, 24/7/61
WILSON, I. A. and M. J., Wrights Bush, 47, 28/7/61

Cancelled Certificates

The following certificates have been cancelled or suspended:

COOPER, A. L., 1 R.D., Hamilton, 110, 20/4/61
HOBSON FARMS LTD. (Farm No. 3), Wharepapa, 129, 30/1/61
HODDER, C. W., Raetihi Rd., Ohakune, 76, 14/3/61
LAING, G. F., Laing's Rd., Karaka, 65, 16/1/61
MOUGHAN, F. J., and SKIDMORE, J., Ashcott Rd., Waipukurau, 75, 30/1/61
ROBB, G. A., No. 3 Line, Wanganui, 75, 6/4/61
ROBINSON, F., Waitoki, Kaukapakapa, 84, 27/3/61
WILLIAMS, R. R., Muhunoa East Rd., Ohau, 33, 22/5/61

Growing Flowers and Foliage for Cutting

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

WHERE a garden is designed to provide material for floral arrangements throughout the year more thought is given to planning for a succession of lovely toning and contrasting colours, shapes, and textures. The need is for a mass of easily grown flowers and foliage at each season, with a few others which may be more difficult to cultivate, to provide strong contrast of colour or form, or subtle blending of flower and foliage for floral arrangements. Flowers which are not used are removed as soon as they are spent to promote further flowering. Thus an attractive mixed flower border is planned and maintained.

THE only plants which do not readily fit into this plan are bulbs and those which are grown for drying or for seed pods. These are unattractive after flowering and should therefore be grown in a less conspicuous part of the garden.

Choice of Flowers and Foliage

The majority of plants must be chosen according to their suitability for the individual section, considerations being soil, climate, and plant requirements. The climate of the garden may be modified but it cannot be entirely altered, so it is the climate which determines whether it is possible to grow certain plants. If hard frosts are experienced, frost tender plants can only be grown as house plants or in a glasshouse; but if there are no frosts, plants such as paeony, lupin, dephinium, and many deciduous trees and shrubs will not grow or flower well.

Points are exposure to winds, proximity to the sea, amount of sunshine or shade, total amount and seasonal distribution of rainfall, and frost; also drainage, soil type (clay, sandy, peaty, etc.), and acidity or alkalinity.

The biggest range of plants can be grown in a sunny, sheltered position on well drained, slightly acid soil, but it is always possible to grow some flowers and foliage and few sections are so difficult to manage that they cannot be improved.

Newcomers to a district may be helped considerably in the selection of plants for their section by local horticultural societies or garden circles, and they can also learn a great deal by observing the plants which are commonly grown in neighbouring gardens.

An extensive list of trees, shrubs, herbaceous perennials, bulbs, annuals, etc., which can be grown on the section should be made and then be

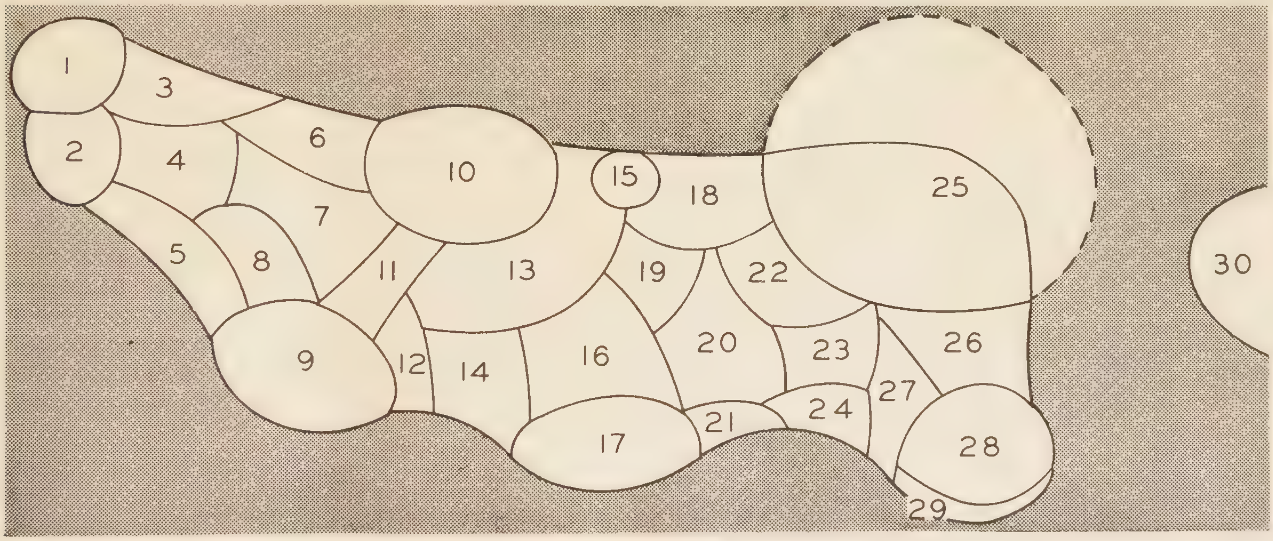


Diagram of an informal mixed flower border set in a lawn, the lower edge facing north. 1—Rose 'Cecile Brunner'. 2—Daphne. 3—Hosta. 4—Calla (pink) and eucomis*. 5—Carnation. 6—Hellebores and/or cyclamen*. 7—Paeony or watsonia. 8—Marguerite or *Euphorbia wulfenii*. 9—Pink diosma. 10—*Camellia sasanqua*. 11—Variegated kale. 12—Nerine. 13—Dahlia and narcissus. 14—Ageratum* or *Senecio laxifolius*. 15—*Jasminum polyanthum* or climbing rose up a post. 16—Bearded iris or marguerite. 17—Erica or thryptomene*. 18—Nandina. 19—*Spiraea prunifolia plena*. 20—Gerbera. 21—Lamb's ear or heuchera. 22—Crotalaria* or chrysanthemum. 23—Bells of Ireland. 24—Billbergia* or pyrethrum. 25—*Magnolia soulangeana* plus bulbs. 26—Canna* or delphinium. 27—Rosemary. 28—*Leptospermum keatleyi*. 29—Pinks. 30—Cherry or *Salix matsudana tortuosa*. * Indicates frost tender subject.

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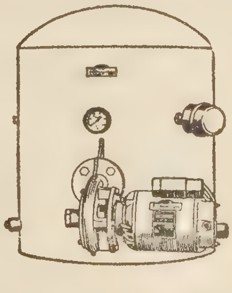

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reviewed so that only those which are suitable for cutting are retained.

Though almost all plants may be used in a decoration, some are much longer lasting or in other ways more useful and are to be preferred where space is limited.

The majority will probably be those in demand by florists, as they are known to be reliable, but new varieties should also be considered. The new variety may be more tolerant of local conditions, or it may last longer when cut, apart from the more obvious differences of colour, height, season of flowering, etc. Old varieties, which have been disregarded for years, may once again prove useful in modern decorations, for fashions in flowers change.

The list should be examined to ensure that flowers and foliage of the desired colour and form will be available throughout the year, for at some seasons there are few flowers, for example, which grow in tall spikes, yet without these many styles of arrangement, especially large ones, are impossible. When there is a selection which varies from tall spikes to large round flowers, and from slender branches to bold solid-looking leaves or rosettes of succulents, the styles of arrangement can be equally varied.

[*Sparrow*

Cut flowers offered for sale by auction in an Auckland market. Each line of flowers is labelled as it is placed on the stands so that the sale price can be recorded in favour of the appropriate grower. Flowers include narcissus, carnation, tingitana iris, calla, wattle, poppies, stock, anemones, cyclamen, *Euphorbia wulfenii*, hyacinth, kniphofia, and protea.

Place in the Garden

Though for convenience all these plants may be grown in neat rows, they may equally well be incorporated in the decorative planting of the garden. For this the mixed border is ideal and it is in keeping with present trends in garden design.

The mixed border is natural in style, with trees, shrubs, and smaller plants furnishing different levels of the same area. It suits flat and sloping sections and modern or older houses.

The plants selected should be grouped so that there is the maximum effect of matching colours and contrasting shapes, or vice versa, throughout the year. If most of the chosen plants are those which thrive locally (but without becoming over-vigorous) they will need the minimum of attention.

Plants which require extra shelter or warmth, excellent drainage, or a soil type different from that present naturally in the garden should not be grown in the mixed border.

Small flower beds, such as those close to the house walls, can easily provide these special requirements. Plants needing maximum warmth and shelter (frost-tender and subtropical plants) may be grown on the north-facing side of the house. Those needing cold damp conditions do well on the south side. If better drainage is needed (for carnations, gerberas, South African and Australian shrubs, etc.) scoria or similar material may be dug into the border, and the surface level raised 5 or 6 in. above the surrounding levels. The small border on acid soil may be heavily limed (for lavender, sweet pea, anemone, carnation, stock, etc.) and an alkaline soil can be treated with flowers of sulphur and large quantities of bulky organic matter to make it suitable for camellia, daphne, ericas, azalea, etc.

When the soil reaction (pH) is changed in this way it is advisable to raise the level of soil in the border to prevent soil water from seeping into it from the surrounding soil and so nullifying the effect of the treatment.

Plants which require warmer, drier conditions in winter will need the added protection of a glasshouse, or they may be grown as house plants. Sansevieria, rex begonia, peperomia, and variegated ivy may all be grown in the house and single leaves removed as required for arrangements.

Some bulbs are so useful that large quantities are wanted for cutting, and these are more easily grown in rows in another part of the garden, such as close to the vegetable garden. It is possible in the North Island to have gladioli blooming at practically any time of the year, but the corms must then be planted at intervals through the year, and the plants sprayed regularly to control thrips. Management of this flower crop is obviously easier when it is grown on its own.

Similarly, the ornamental gourds and everlastings are more easily cultivated apart from the mixed flower border.

CULTURE

Shelter

Windbreaks are essential for growing good-quality unblemished cut flowers on exposed sections, as the delicate petals are easily bruised or scorched and the stems bent by strong winds. Where space is limited a solid fence is most suitable, but it is expensive. Hedges are often cheaper, but they take at least three years to give adequate shelter and need constant attention. Hedges of abelia, phebalium, and *Lonicera nitida* can be kept narrow; others, which may be grown informally, need considerably more

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space, but are useful for cutting; for instance, berberis, cotoneaster, and rhododendron. Podalyria and bottlebrush may also be used in this way, but tend to become straggly and open at the base unless carefully pruned.

Drainage

If the soil is not well drained, plants look sickly, growth and flowering is unsatisfactory, and losses during hot, dry weather following prolonged winter and early spring rains will be high.

Many shrubs and trees appear to grow well for the first three to five years, and then collapse suddenly when they are just beginning to produce useful flowers, foliage, etc., because their roots have penetrated deeper into the soil and are more subject to waterlogging.

Leaves turn yellow and plants cease to grow and may even die back from the tips because the roots are affected by waterlogging, and the lack of oxygen and infection by diseases which are so often associated with it.

Some plants are more susceptible than others (for example, carnations, gerberas, anemones, ranunculus, roses, and most Australian and South African shrubs) and these should be grown on raised beds. Larger areas should be drained with tile or scoria drains, and though this is costly, it is the most effective answer.

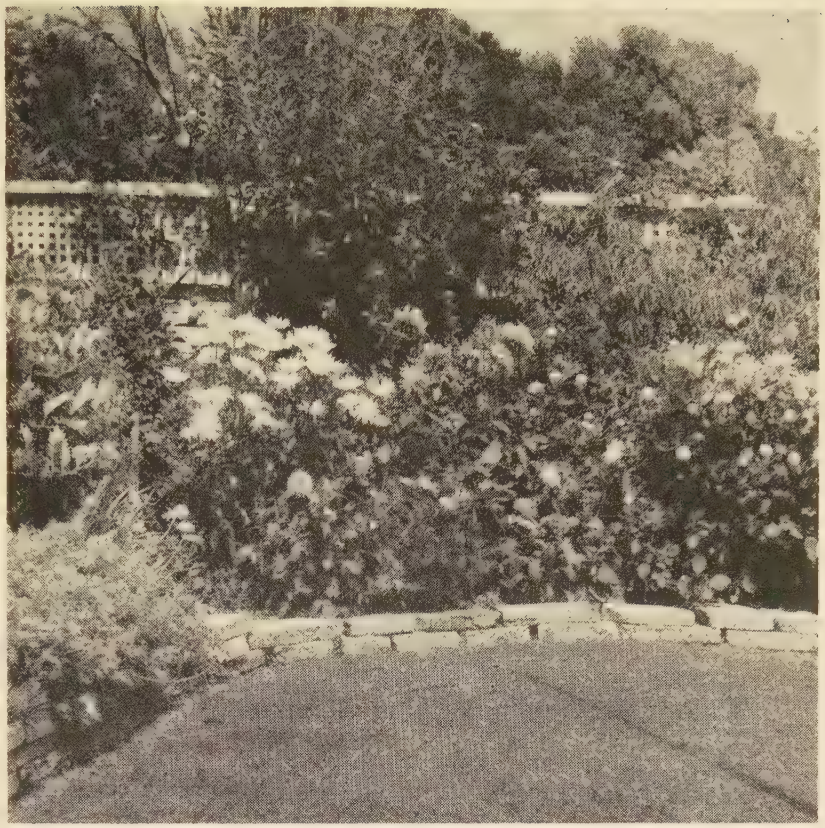
Water Supply

During hot, dry spells when the plants are wilting the need for water is obvious, but lack of water can check the growth of plants seriously even before the leaves wilt. Ideally, water should be applied with hose or sprinkler in the evenings and in sufficient quantity whenever necessary to maintain the growth and development of plants. Owing to restrictions on the use of the public water supply, however, or to the lack of water when the house is dependent on tank supply, only waste water from kitchen and bathroom may be available during summer, when water is most needed in the garden.

Water, when so restricted, should be reserved for plants which are most susceptible to drought: seedlings, newly planted stock of all kinds, herbaceous perennials with soft thin green leaves, heathers, and other shallow-rooted shrubs.

Water may be retained in the soil by cultivating various materials into the soil before planting and by covering the surface of the damp soil with mulches which restrict evaporation.

Mulches may be of almost any material available, thin black plastic, compost, leaf or bush mould, untreated sawdust, pine needles, small stones, scoria or pumice, grass mowings, peat, seaweed, and even mouldy hay and similar farm waste. Some of these have obvious disadvantages, such as weed seeds, but the best one available should be chosen according to the type of plant being grown.



A mixed border of herbaceous perennials and dahlias, with ornamental trees in the background.

In very light sandy or volcanic soils, moisture-retaining materials such as those used for mulches may be dug into the soil when preparing the flower bed for planting. Animal manures and clay are also valuable for this purpose.

Manuring

Bulky organic matter is advantageous on most types of soil for annuals, herbaceous perennials, the gross-feeding shrubs (N.S.W. waratah, roses, poinsettia, and most deciduous shrubs) and some "bulbs" (anemones and ranunculus).

Gross-feeding plants should also receive annually about 4 oz to the square yard of a balanced fertiliser mixture. This is worked into the soil before planting, or for permanent crops it can be applied round the plant in early spring and hoed or watered in.

Blood and bone is commonly used as a fertiliser, but it contains no potash, and this is essential for plant health and for flower production. Sulphate of potash should be added at 1 oz to every 8 oz of blood and bone if this is used in place of the balanced mixture.

During spring and summer additional light dressings of blood and bone alone may be applied to roses, chrysanthemums, dahlias, gerberas, and carnations to encourage vigorous growth and flowering.

Most Australian and South African shrubs, and bulbs, are more easily grown and flowered without using much manure of any kind, as this can produce soft over-vigorous growth more liable to disease.

Liming

If the soil is very acid, camellia, rhododendron, erica, and many lilies and allied plants will flourish, but many other plants will not grow well. On a chalky soil the plants named above are stunted, with yellow leaves, and are short lived; whereas plants which enjoy alkaline soil conditions will thrive.

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FISONS PEST CONTROL

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Fortunately, most plants tolerate a wide soil range and will produce a reasonable quantity of material for cutting in any garden, provided the climate is acceptable. Prize specimens are not generally required and in most sections, where a mixed flower bed is the main source of supply, it is impractical to give special treatment to any portion of it.

Plants should be carefully selected, as any great alteration in the pH of the soil is unlikely to be permanent. If possible, a pH of 6.0 to 6.5 (slightly acid) is the most desirable level.

The use of compost and other bulky organic manures may acidify the soil, and in high rainfall areas (more than 35 in. a year) lime is washed out. Regular application of lime is therefore advisable.

The amount of lime to apply depends on the acidity of the soil and the proposed crops. On a very acid soil in a high rainfall area 1 lb of agricultural lime to the square yard per annum is not too much for flower crops which require an alkaline soil (tulips, anemone, stock, sweet pea, paeony, carnation, scabious and lavender). Apply it to the surface of the soil after digging or cultivating in winter.

Agricultural lime is cheaper and no less effective than any other type of lime on the market.

On an alkaline soil, acid-loving plants may be grown in prepared raised beds. The beds should be raised at least 6 in. so that the soil is not contaminated by alkaline soil water seeping in from the surrounding level. Deep-rooting shrubs and trees should not be grown, as these will root into the alkaline soil deeper down as they grow older. Apply sulphur each winter at 4 oz to the square yard, and apply leaf mould or compost as a mulch.

However, the best results will be obtained by selecting plants which are suitable to the natural conditions of the garden.

Health

Well grown healthy stock protected from pests and diseases is essential if first-class cut flowers and foliage are to be produced. Diseases are easily introduced to a garden on infected plants or cuttings and they may then be difficult or even impossible to control. This is common with the soil-borne diseases (fusarium, sclerotinia, phytophthora, eelworm, etc.) and those which are inside the plant (viruses, verticillium wilt, etc.).

Other pests and diseases may infect plants later (aphids, mildew, etc.) and these must be controlled, as far as possible, with therapeutants which leave little or no unsightly deposit.

Thinning

To produce strong stems of good quality flowers from shrubs and herbaceous perennials it is essential to remove thin, weak shoots early. This is part of the normal pruning of shrubs. Strong shoots of herbaceous plants should be selected in spring when they are 4 in. to 8 in. long, and all others removed. If the remaining stems are very numerous and crowded, some of these must also be cut out so that those which are left to grow and produce flowers are well spaced. Those which have been removed may be used as cuttings.

Staking

Staking and tying are necessary with some herbaceous perennials, and should be done as soon as possible after thinning, and while the soil is still soft and moist after winter rains.

Stakes of manuka, beech, and similar twiggy branches may be pushed in around and between each clump so that the stems will grow up through these supports to hide them. These stakes should be at least 6 in. shorter, when inserted, than the ultimate height of the mass of foliage of the plant; otherwise they will be more conspicuous than the flowers.

Several bamboo canes or manuka stakes may be placed round each plant, with soft string or nylon ties between. Individual spikes of gladioli, delphinium, etc., should each have a support of this kind.

Many gardeners dislike staking, and it is possible to find types or varieties of flowering and foliage plants which do not need it. Dwarf types are

Flowers and Foliage for Cutting and Suitable for the Average Home Garden

SHORT PLANTS

Annuals

Antirrhinum
Aster
Bells of Ireland
Calendula
Euphorbia marginata
Gomphrena
Gourds
Ornamental beet
Marigold
Salvia
Statice
Stock
Variegated kale
Zinnia

Perennials

*Anthurium
*Billbergia
*Begonia rex
Catmint
Carnations and pinks
Ferns
Gerbera
Gaillardia
Geranium
Helleborus
Heuchera
Iris
Lily of the Valley
Lamb's ear
*Orchid
Polyanthus
Pyrethrum
Plantain lily
Salvia
Scabious
Succulent plants
Talinum
Tradescantia
Violet

Bulbs

Anemone
Calla
Cyclamen
Freesia
Hyacinth
Iris
Ixia
Lachenalia
Montbretia
Muscari
Narcissus
Nerine
Ornithogalum
Ranunculus
Sternbergia
Snowdrop
Tritonia
*Tuberose
Tulip

Shrubs

Adenandra
Coleonema
Daphne
Heather
Ivy
Phylica
Periwinkle
Thryptomene
*Tweedia

MEDIUM PLANTS

Annuals

Helichrysum
Humea
Rhodanthe

Perennials

Ageratum
Aquilegia
Bearded iris
*Bird of Paradise
Centaurea gymnocarpa
Coreopsis
Chrysanthemum
Dahlias
Eryngium
Euphorbia wulfenii
Flax
Gypsophila
Golden Rod
Helianthus
Helenium
Hemerocallis
Kniphofia
Liatris
Michaelmas daisy
Marguerites
Phlox
Paeony
Rudbeckia
Santolina
Solomon's seal

Bulbs

Agapanthus
*Clivia
*Eucomis
Gladiolus
Lily
Watsonia

Shrubs

Boronia
Broom
Daphne
Lavender

TALL PLANTS

Perennials

*Canna
Delphinium

Shrubs

Aucuba
Banksia
Callicarpa
*Calythrix
Camellia
*Ceratopetalum
Cherry
*Crotalaria
Cypress
Dryandra
*Frangipani
Forsythia
Grevillea
*Hibiscus
Jasmine
Japonica
Leonotis
Leucadendron
Leucospermum
Lilac
Magnolia
Manuka
Maple
Pittosporum
Prunus
*Poinsettia
Protea
Roses
Spiraea
Viburnum
Waratah
Willow

Climbers

*Cobaea
Jasmine
Sweet pea

* Frost tender

For descriptions of the above plants see Richmond E. Harrison's "Handbook of Bulbs and Perennials for the Southern Hemisphere" and "Handbook of Trees and Shrubs for the Southern Hemisphere".

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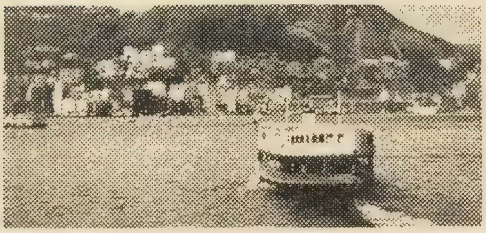

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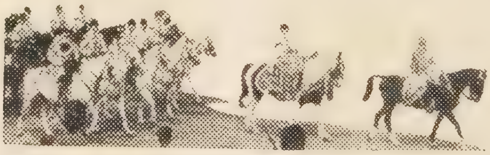

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usually more in proportion with the smaller sections. Many modern varieties are much stronger or more wiry in the stem, and the range of self-supporting plants is constantly increasing. Stems are always sturdier when they are not crowded, and when they are in an open, sunny position.

Disbudding

When the flower buds form on roses, carnations, chrysanthemums, dahlias, etc., surplus buds should be rubbed out when they are small so that long-stemmed blooms are available for cutting later. It is not necessary to disbud all types of flowers. Some do not respond to this treatment, and also sprays of smaller flowers are needed in arrangements.

Cutting

Cut flowers and foliage in the early morning or late evening when they are cool. Strip off lower leaves and give any special treatment necessary for woody stems, those with milky sap., etc. (as described in the June 1959 issue of the 'Journal"). Then place the stems immediately in deep cold water in a cool dark room, out of draughts, for at least four hours and preferably overnight.

Any flowers which are not cut should be removed as soon as they fade, so that the vigour of the plant is not wasted in the production of unwanted seeds. Many flowering plants produce further crops of flowers with this attention, and the flower border looks better as well.

Cutting for Preserving

Branches and individual leaves must be cut when growing vigorously so that the preservative (2 parts of water to 1 part of glycerine) is quickly distributed in the sap stream. Remove and store dry as soon as the leaves are of a sufficiently dark colour.

Drying

Cut flowers at about the same stage of development as for fresh arrangements. Strip off all leaves, tie in small bunches, and hang upside down in a dark, dry airy room until thoroughly dry. Stiff stems of bird-of-paradise, bullrush, and some seed heads may be dried and stored upright in jars.

Commercial Cut Flower Growing

Though the basic rules of growing are the same whether a dozen plants or thousands are grown, the details vary considerably.

Only one or two types of flowers may be grown instead of the large variety required by the home gardener and flower arranger. These are chosen to suit the demands of the market; and the local soil and climatic conditions. They may be planned to supply the market regularly throughout the year, or the grower may specialise in only one type of flower.

Conditions for growing the chosen crops are improved by providing shelter and drainage, and by increasing the fertility of the soil.

Flower crops are often grown commercially in rows in slightly raised beds. The width of each bed is such that it is easy to pick and attend to all the plants from the pathways, and to permit the wheels of tractor-drawn spraying and cultivation equipment to pass down the paths without damaging the beds.

Special attention must be paid to pest and disease control, as damage of any kind will reduce the value of the blooms.

Flowers and foliage must be cut at the correct stage of development, hardened in deep cold water, and graded rigorously according to quality, size of bloom, length of stem, etc., before being packed and sent to market.

Work for November

Sow

Sow seeds of herbaceous perennials and shrubs and make a late sowing of annuals as detailed last month. Water thoroughly after sowing if the soil is dry, and repeat as necessary during dry spells until the seedlings are well established. If possible, always water in the evening to avoid scorching the soft young leaves. Light shading during the heat of the day is also beneficial.

Sow polyanthus and primula seed as soon as it is ripe. As these seeds require light for germination, do not cover the seeds deeply. Do not allow these seeds to dry out once they have started to germinate. Small quantities may be sown on the sanded surface of a pot or box without any soil covering. Water from below, cover with glass or plastic, and place in a warm, shaded position. When the seedlings are growing, gradually lift the glass to allow them to harden off.

Sow seeds of biennials (Canterbury bells, foxglove, honesty, Brompton stock, sweet william, and wallflowers) as soon as possible, so that they have the maximum time to develop before winter. Well grown plants will produce the best flowers next season.

Plant out or thin out seedlings as soon as they are large enough to handle so that they develop into sturdy plants. Overcrowded seedlings are much more likely to become diseased, and they will never produce good quality flowers.

Complete the planting of summer bedding plants as soon as possible. Extra care will be needed with this late planting during hot, dry spells.

Leaves of spring flowering bulbs are beginning to die down. They should not be removed until they are completely dry and brown. If bedding plants or summer flowering herbaceous plants have been planted in front of the bulbs, the dying foliage of the latter will be hidden. The only alternative is to lift the bulbs and heel them in in another part of the garden.

Prune spring flowering shrubs.

Tie in the new stems of climbing plants to their supports. Loose ties should be used, to allow for growth during summer.

Prune old-fashioned shrub roses as soon as flowering is over by cutting away all stems which have flowered. This will prevent the formation of rose-hips and will concentrate the vigour of the plant into the new stems, which will flower next season. If desired, a few hips may be allowed to ripen on very vigorous varieties for use later on in floral decoration.

Bush roses are now in full flower. Cut the blooms with long stems until the main flush of flowers is over. From the end of November cut flowers with shorter stems and apply a light topdressing of a balanced fertiliser. If the roses are to be summer pruned in January, the topdressing is not applied until them.

In the hotter parts of the country roses and other shrubs, particularly rhododendron, azalea, kolkwitzia, kalmia, and other cool-climate types, may require watering and mulching. Grass mowings are useful when no other mulching material is available, but apply only a thin layer. Surplus grass mowings can be composted with untreated sawdust.

All shrubs should be growing vigorously at this time of the year. Reasons for lack of healthy growth may be insufficient light, warmth, drainage, or nutrients. If drainage is adequate, and the plant is suitable for the climate and position in the garden but growth is still unsatisfactory, the possibility of a lack of plant nutrients should be considered.

As many shrubs grow and flower better in poor soils, it is inadvisable to apply heavy dressings of fertilisers to sick plants, but a **light** dressing may be most beneficial, when applied to moist soil and watered in thoroughly.

Nitrogen, phosphorus, and potash should be applied first, for example as blood and bone and sulphate of potash, but if these do not produce the desired response, other minerals, most commonly magnesium and manganese, may be needed.

When magnesium is lacking, leaves are usually pale yellow and the older ones turn brown. Magnesium can be applied in spring as Epsom salt, about 4 oz per large bush being used, dissolved in water and washed into the soil.

Manganese is best applied as a foliage spray in spring, the application being manganese sulphate 4 oz, hydrated lime 5 oz, in 4 gallons of water made up in the same way as bordeaux mixture. Manganese deficiency is commonly recognised by a yellowing of the leaf, with the large veins showing up prominently as dark green bands.

Spray gladiolus regularly with DDT at 1 oz of 20 per cent emulsion in 4 gallons of water to control thrips.

Bronze and brown beetles are common this month and may damage leaves and flower buds of roses and many other shrubs. Spray with DDT 50 per cent wettable powder at ½ oz in 4 gallons of water.

Shows

Many shows are held in November and gardeners should decide on their entries well in advance. Selected blooms may require disbudding, staking, and shelter from sun and wind in order to develop as perfectly as possible. Adequate watering and possibly some extra feeding may be necessary.

Water and mulch delphiniums. Cut spikes for decoration or when they are spent, leaving as many leaves as possible on the plant for the production of a second crop of flowers later in the season.

Most flowers are cut the evening before the show and placed in deep cold water overnight. A few spike flowers are more satisfactory if cut as soon as the first flower on the spike opens, even though with gladioli this may be four days before the show. The spike continues to open slowly if placed in a cool temperature, but rapidly in a warm room, and of course the flowers are unaffected by external weather conditions. Under ideal conditions the spike will have the maximum number of flowers open with none past their best when they are ready to be judged.

Show committees and garden circles can help and encourage new exhibitors a great deal by arranging demonstrations of the selection, preparation, and staging of show blooms before the local show.

Glasshouse and House Plants

Repot house plants as necessary, and pot up seedlings and newly rooted cuttings. Always use the smallest pot commensurate with the size of the root system. After potting, water in and place the pots close together. Keep shaded in a damp still atmosphere until the plants are growing again.

Glasshouses require shading during summer. Fibre-glass screening, now available in New Zealand, may be attached to the outside of the glasshouse or made up into blinds. White polythene, scrim, or cheese cloth are cheaper alternatives; or lime wash to which a little skim milk has been added may be sprayed or painted on the glass.

Any plants which do not require the protection of a glasshouse may be transferred to a shade house. Fuchsias, ferns, foliage plants, many orchids, and native plants grow very well in shade houses and require considerably less watering. If a new shade house is being constructed, fibre-glass screening should be considered as a covering to the framework. Though it costs more than traditional coverings, it is light, long-lasting, and is an effective break wind.

Water all pot plants more frequently and apply dilute liquid manure every 10 to 14 days to plants which are pot bound.

Floral Decoration

The tall blue spikes of delphiniums are most effective in large arrangements, but they may wilt at the tips. Cut the spikes in the early morning or evening, strip off unwanted leaves, and pour water into the hollow stem. A plug of cotton wool may be used to retain water in the stem until it is stood upright in deep water, or the end of the stem may be covered with the thumb. There should be no delay between cutting the spike and placing it in water.

Arrangements will last longer if they are in a cool atmosphere out of direct sunshine or draughts.

Quick Breads to Cut and Butter

[*Sparrow*

▲ The quantities given for boil and bake fruit loaves make three generous loaves like the one illustrated.

AMONG the best stand-bys for the busy housewife who has to provide seemingly endless morning and afternoon snacks for hungry men and children are quick breads made without yeast. The recipes given all make delicious large loaves which keep well (if given a chance) and cut easily. Loaves of this type usually slice better if they are kept for a day or two before cutting.

INSTEAD of the usual loaf pan, try baking the loaves in square or round tins to vary the shape, or use clean baking powder tins, two tins to one loaf recipe.

It is not necessary to line the baking tins with paper, but always grease them well with melted butter so that the loaves will not stick and the crust will be crisp yet tender. To ensure a good crust always remove the loaves from the baking pan as soon as they are cooked and let them cool thoroughly on a wire rack before storing in an air-tight tin.

By NAOMI F. BANKS,
Home Science Instructor,
Department of Agriculture,
Auckland

Boil and Bake Fruit Loaves

2 tablespoons of golden syrup
1 lb of sugar
16 oz of water (2 cups)
1 lb of dried fruit (sultanas, raisins, figs)
½ lb of butter
2 teaspoons of soda
1 lb 8 oz of flour
2 teaspoons of baking powder
1 teaspoon of cinnamon
1 teaspoon of mixed spice
2 teaspoons of ginger

Mix the syrup, sugar, water, fruit, and butter in a large saucepan, bring to the boil, and simmer for 5 minutes. Mix in the baking soda and set aside to cool.

Sift the dry ingredients together and mix them into the cooled mixture in the pan.

Bake in three loaf tins or one large square tin, well greased, at 350 degrees F.

The three loaves take 35 to 45 minutes and the large tin 1 to 1½ hours. This keeps extremely well.

Banana Loaf

4 oz of butter
6 oz of sugar
1 egg
2 bananas
8 oz of flour
½ teaspoon of baking soda
2 oz of milk
Vanilla

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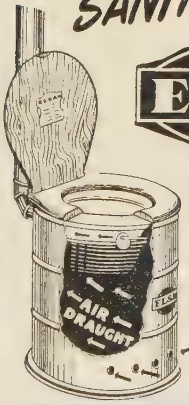

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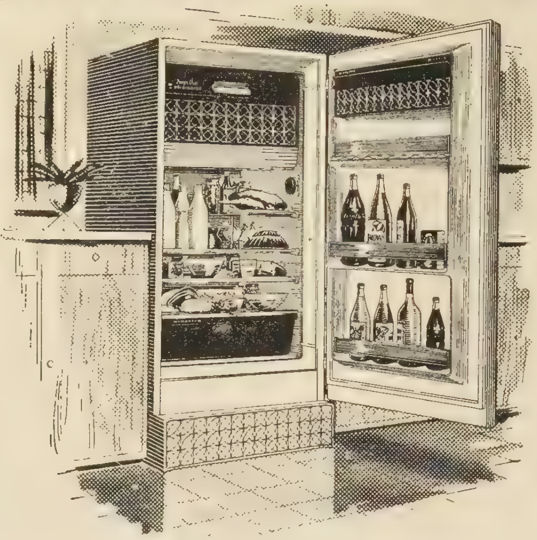

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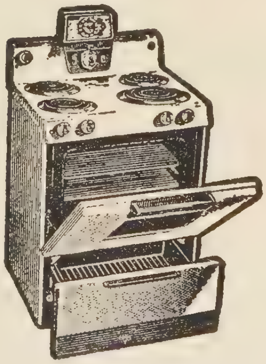

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Cream the butter and sugar. Beat in the egg, then the mashed banana. Fold in the flour. Dissolve the soda in the milk and stir into the mixture together with the vanilla.

Pour into a greased 7½ in. square tin.

Bake at 375 to 400 degrees F for 40 minutes.

Plum Perfect Tea Cake

- 8 oz of flour
- 2 teaspoons of baking powder
- ¼ teaspoon of salt
- 4 oz of butter
- 1 egg
- ½ cup of milk
- 18 small prunes
- 2 oz of brown sugar

Sift the flour, baking powder, and salt into a bowl. Rub in 2 oz of butter. Combine the egg and milk and stir into the flour mixture, making a soft scone dough.

Knead into a ball and roll out on a floured board to ¼ in. thick. Cut the dough into 18 squares and roll each square round a stoned prune. Dip each ball in the remaining butter, melted, then brown sugar. Pack into a well greased ring tin or a round cake tin and bake at 400 degrees F for 30 minutes.

When cold break off pieces, split, and butter to serve.

For a special treat place a blanched almond in the centre of each prune before covering with dough.

Coconut Ice Loaf

- 6 oz of desiccated coconut
- 12 oz of sugar
- 8 oz of self-raising flour
- 12 oz of milk (1½ cups)
- ½ teaspoon of salt

Mix all the dry ingredients together, then stir in the milk mixing well, but do not beat.

Line a loaf tin with greaseproof paper and brush with butter. Pour the batter into the tin.

Bake at 400 degrees F, 45 to 60 minutes.

This loaf slices well and keeps fresh for a week.

Quick 'n Easy Raisin Bread

- 1 oz of butter
- 1 cup of raisins
- 8 oz of sugar
- 1 cup of water
- 1 teaspoon of baking soda
- 12 oz of flour
- 1½ teaspoons of baking powder
- 1 teaspoon of mixed spice
- ¼ teaspoon of nutmeg
- 1 egg

Mix the butter, raisins, sugar, water, and baking soda in a pan and slowly bring to the boil. Set aside to cool slightly. Sift the dry ingredients together and stir them into the cool liquid. Beat in the egg.

Pour into a greased loaf pan, or two baking powder tins.

Bake at 400 degrees F for 30 to 40 minutes.

Gingerbread

- 1 cup of treacle
- 3 oz of brown sugar
- 2½ oz of butter
- 1 cup of boiling water
- 12 oz of flour
- 1 tablespoon of ginger
- 2 teaspoons of cinnamon
- ½ teaspoon of salt
- 1 teaspoon of baking soda
- 2 eggs

Pour the boiling water over the treacle, sugar, and butter and stir until the butter is melted.

Sift the dry ingredients together and beat into the liquid, beating until very smooth.

Beat the eggs and stir them in quickly.

Bake in a shallow greased tin at 350 degrees F for 40 to 45 minutes.

Let cool in the tin.

Apricot Nut Loaf

- ½ cup of dried apricots
- ½ cup of water
- 8 oz of flour
- 3 teaspoons of baking powder
- ¾ teaspoon of salt
- ¼ teaspoon of soda
- 1 egg
- 8 oz of sugar
- 2 tablespoons of melted butter
- ½ cup of orange juice
- 1 cup of chopped nuts

Soak the apricots in the water for 30 minutes, drain, and chop. Beat the egg until foamy, add the sugar, and beat until light. Add the melted butter and orange juice and stir this mixture into the sifted dry ingredients. Fold in the chopped apricots and nuts, and pour the mixture into a well greased loaf tin. Bake in a moderate oven (350 degrees F) for one hour.

Crunchy Top Peanut Loaf

Grease a medium-sized loaf tin and spread with:

- 1 oz of softened butter
- 2 tablespoons of brown sugar
- ½ cup of chopped peanuts

Batter for Loaf

- 8 oz of flour
- ½ teaspoon of soda
- 1 teaspoon of baking powder
- 1 oz of butter
- 2 tablespoons of peanut butter
- ½ teaspoon of salt (if salted peanuts are used for the topping, omit the salt)
- 1 egg
- 6 oz of brown sugar
- 1 cup of milk

Sift the flour, soda, baking powder, and salt together. Melt the butter and peanut butter. Beat the egg and brown sugar together until thick and stir the butter, peanut butter mixture, and the milk into this.

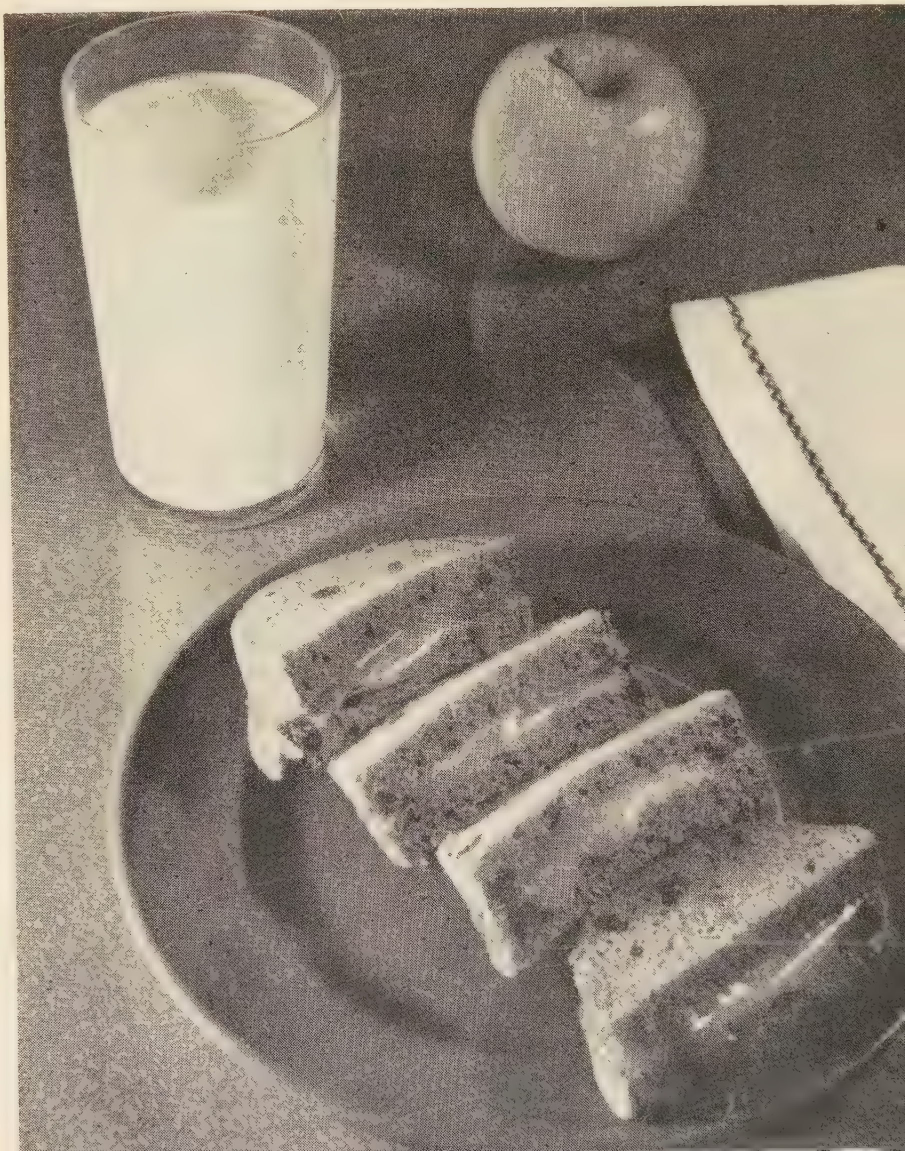
Mix the liquid and dry ingredients together; blend well, but do not beat.

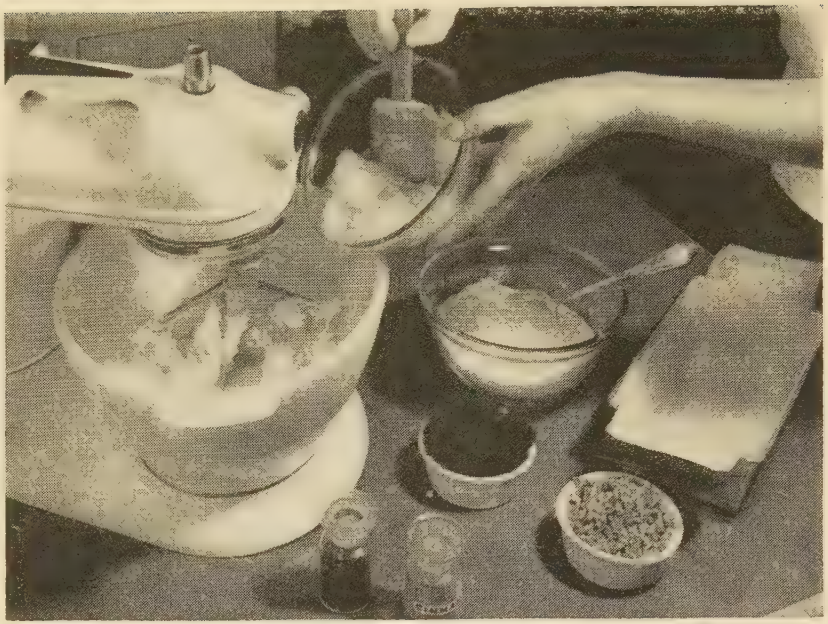
Pour the batter over the topping in the tin.

Bake at 350 degrees F for 1 hour.

↓ Thick slices of moist raisin loaf, sandwiched together with lemon honey, with a glass of milk and a crisp apple, make an ideal school snack for a hungry teenager.

[*Sparrow*





[Sparrow

Apple puree folded into the creamed mixture gives this eggless apple loaf a delicate fruity flavour and a good texture. Chopped peanuts can be substituted for the walnuts, or the nuts may be left out altogether if a really economical loaf is wanted.

Moist Raisin Loaf

1½ cups of raisins
1½ cups of water
2 oz of butter
¾ cup of brown sugar
1 egg
6 oz of flour
½ cup of raisin water
1 teaspoon of soda
1 teaspoon of nutmeg
1 teaspoon of cinnamon
¼ teaspoon of ground cloves
½ teaspoon of vanilla essence

Simmer the raisins in the water for 20 minutes, drain, and save ½ cup of the raisin water.

Cream the butter and brown sugar together, add the egg and beat well. Dissolve the soda in the raisin water. Sift ½ cup of the flour over the raisins. Sift the remaining flour and spices together and fold into the creamed mixture alternately with the raisin water. Stir in the floured raisins and vanilla.

Bake in a greased 4 in. x 8 in. loaf tin or greased baking powder tins at 350 degrees F for 35 minutes.

Hidden Gold Apple Loaf

3 oz of dried apples
1 cup of golden syrup
4 oz of butter
½ cup of sour milk
1 egg
8 oz of flour
1 teaspoon of baking soda
½ teaspoon of mixed spice
¼ teaspoon of ground cloves

Cut the apples finely and boil gently in the golden syrup for 20 minutes, when the apples will be like soft preserves.

Drain the syrup off and mix with the butter, sour milk, and egg.

Sift the dry ingredients together, fold into the liquid. Stir in the apples.

Pour into a well greased loaf tin.

Bake at 375 to 400 degrees F for 45 minutes.

Twice Toasted Coconut Loaf

1 cup of coconut
12 oz of flour
3 teaspoons of baking powder
8 oz of sugar
½ teaspoon of salt
1 egg
1½ cups of milk
¼ teaspoon of almond essence

While the oven is heating to 350 degrees F toast the coconut in a shallow pan, shaking occasionally until it is golden.

Sift the flour, baking powder, sugar, and salt together and stir in the toasted coconut.

Beat the egg until it is thick and foamy, then beat in the milk and almond essence.

Stir the liquid into the dry ingredients and mix thoroughly, but do not beat.

Pour into a well greased medium loaf tin.

Bake at 350 degrees F for 1 hour.

This loaf is delicious after a few days, sliced and toasted.

Fig and Walnut Loaf

8 oz of flour
1 teaspoon of salt
4 teaspoons of baking powder
4 oz of sugar
4 oz of wholemeal flour
1 cup of chopped walnuts
½ cup of chopped dried figs
1 egg
1½ cups of milk

Sift the flour, salt, baking powder, and sugar together and mix in the wholemeal flour, nuts, and figs. Beat the egg and milk together, and add to the dry ingredients, stirring enough only to dampen the flour. (Do not worry if the mixture looks slightly lumpy.)

Pour into a greased loaf tin. Bake at 350 degrees F for 1 hour.

Eggless Apple Loaf

4 oz of butter
8 oz of sugar
1 teacup of unsweetened apple puree
8 oz of flour
1 teaspoon of baking soda
½ teaspoon of cinnamon
¼ teaspoon of ground cloves
½ cup of chopped walnuts
½ cup of chopped raisins or sultanas

Cream the butter and sugar together. Add the apple puree and beat well. Sift the flour, soda, and spices together and fold into the creamed mixture. Stir in the nuts and fruit.

Spoon into a buttered loaf tin and bake at 350 to 400 degrees F for 45 minutes.

Cool and drizzle a lemon water icing over the top if desired.

Economy Fruit Loaf

(No eggs, no butter)

8 oz of flour
¼ teaspoon of salt
1 dessertspoon of baking powder
4 oz of sugar
3 oz of dried fruit
1 cup of milk
1 good tablespoon of golden syrup

Sift together the flour, salt, baking powder, and sugar and add the fruit.

Stir in the milk and golden syrup, mixing well.

Place in a greased loaf pan.

Bake at 350 degrees F for 1 hour.

Malted Date Bread

1 tablespoon of butter
6 oz of sugar
1 tablespoon of malt
1 egg
1 teaspoon of vanilla essence
5 oz of flour
5 oz of wholemeal flour
1 cup of dates, chopped
1 teaspoon of soda
1 cup of boiling water

Dissolve the soda in the water, pour over the dates, and set aside to cool.

Cream the butter, sugar, and malt. Beat in the egg and vanilla essence. Stir in the date mixture and then the wholemeal and flour sifted together.

Pour into a greased loaf tin and bake at 350 to 400 degrees F for 1 hour.

Poppy Seed Loaf

12 oz of flour
1 teaspoon of baking soda
2 teaspoons of cream of tartar
½ teaspoon of salt
⅓ cup of poppy seeds
4 oz of sugar
2 oz of butter
2 eggs
1 teaspoon of grated lemon rind
1 cup of milk

Sift together the flour, soda, cream of tartar, and salt, then stir in the poppy seeds and grated lemon rind.

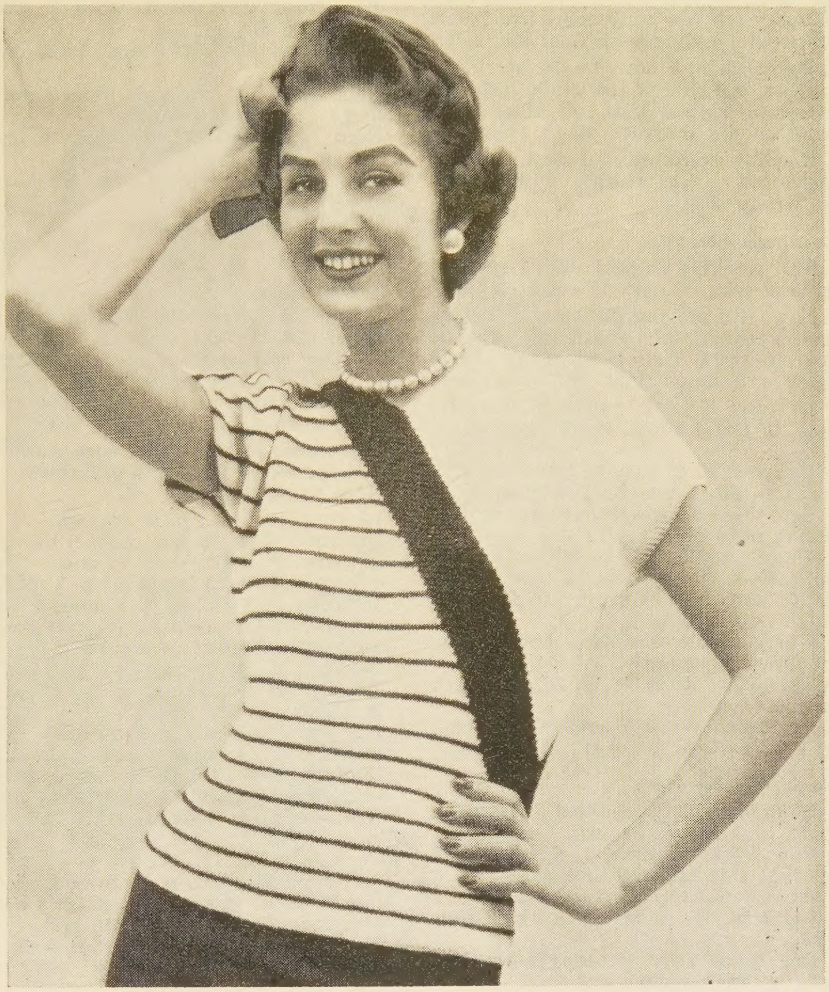
Beat the eggs and sugar together until thick and creamy, melt the butter, and add to the egg and sugar mixture. Stir this into the dry ingredients alternately with the milk. Do not beat.

Pour into one large or two small greased loaf tins and bake at 400 degrees F for 40 to 50 minutes.

This loaf cuts well and has a delightful crunchy texture and nutty flavour.

Attractive Striped Sweater

STRIPES, no matter which way they run, are always fashionable and smart. The attractive 3-ply jersey at right combines horizontal stripes with a wide diagonal stripe to give a very fetching appearance.



ABBREVIATIONS: K., knit; p., purl; st., stitch(es); tog., together; sl., slip; p.s.so., pass slipped stitch over; inc., increase; dec., decrease; lt., light; dk., dark; st.st., stocking stitch; g.st., garter stitch; patt., pattern; rem., remaining.

Measurements: Length: 21in.; to fit a 34in. bust.

Materials: 2oz. of 3-ply wool in a dark colour; 5oz. in a light colour; 2 No. 10 knitting needles.

Tension: 7 st. to 1in.

The Front

Using No. 10 needles and lt. wool, cast on 106 st. and work in g.st. (every row k.) for ½in. Now work 4 rows in st.st. Change to dk. wool and k. 2 rows. Change to lt. wool and work 8 rows in st.st.

Rep. these last 10 rows once more.

Change to dk. wool and k. 2 rows.

Now work thus, twisting wools on wrong side when changing colour.

1st row: K. 1 dk., k. lt. to end.
2nd row: P. lt. to last st., k. 1 dk.
3rd row: K. 2 dk., k. lt. to end.
4th row: P. lt. to last 2 st., k. 2 dk.
5th row: K. 3 dk., k. lt. to end.
6th row: P. lt. to last 3 st., k. 3 dk.
7th row: K. 4 dk., k. lt. to end.
8th row: P. lt. to last 4 st., k. 4 dk.
9th row: K. dk. to end.
10th row: As 9th row.
11th row: K. 6 dk., k. lt. to end.
12th row: P. lt. to last 6 st., k. 6 dk.
13th row: K. 7 dk., k. lt. to end.
14th row: P. lt. to last 7 st., k. 7 dk.

Work should now measure about 4½in.

Change to No. 12 needles.
15th row: K. 8 dk., k. lt. to end.
16th row: P. lt. to last 8 st., k. 8 dk.
17th row: K. 9 dk., k. lt. to end.
18th row: P. lt. to last 9 st., k. 9 dk.
19th row: K. dk. to end.
20th row: As 19th row.

Cont. thus, working an extra st. in dk. wool in every right side row, keeping continuity of g.st. stripes in dk. wool across rem. st. and allowing for the extra dk. st. in these 2 rows when working the next lt. row, until there are 20 st. in dk. wool at one end of needle. Thus the last 3 rows will read:—

38th row: P. lt. to last 19 st., k. 19 dk.
39th row: K. dk. to end.
40th row: As 39th row.

A second ball of lt. wool will now be required, so that there will be a ball of lt. wool on each side of the dk. band.

When changing wools the two colours must be twisted together on wrong side at both edges of dk. band.

Change to No. 10 needles.
41st row: Join second ball of lt. wool and k. 1 lt., k. 20 dk., k. lt. to end.

42nd row: P. lt. to last 21 st., k. 20 dk., p. 1 lt.
43rd row: K. twice in first st. lt., k. 1 lt., k. 20 dk., k. lt. to last st., k. twice in last st.
44th row: P. lt. to last 23 st., k. 20 dk., p. 3 lt.
45th row: K. 4 lt., k. 20 dk., k. lt. to end.
46th row: P. lt. to last 24 st., k. 20 dk., p. 4 lt.
47th row: K. twice in first st., k. 4 lt., k. 20 dk., k. lt. to last st., k. twice in last st.
48th row: P. lt. to last 26 st., k. 20 dk., p. 6 lt.
49th row: K. 7 lt., k. dk. to end.
50th row: K. dk. to last 7 st., p. 7 lt.
51st row: K. twice in first st., k. 7 lt., k. 20 dk., k. lt. to last st., k. twice in last st.
52nd row: P. lt. to last 29 st., k. 20 dk., p. 9 lt.
53rd row: K. 10 lt., k. 20 dk., k. lt. to end.
54th row: P. lt. to last 30 st., k. 20 dk., p. 10 lt.
55th row: K. twice in first st., k. 10 lt., k. 20 dk., k. lt. to last st., k. twice in last st.
56th row: P. lt. to last 32 st., k. 20 dk., p. 12 lt.
57th row: K. 13 lt., k. 20 dk., k. lt. to end.
58th row: P. lt. to last 33 st., k. 20 dk., p. 13 lt.
59th row: K. twice in first st., k. 13 lt., k. dk. to last st., k. twice in last st.
60th row: K. dk. to last 15 st., p. 15 lt.

Cont. thus, moving the band of 20 dk. st. 1 st. to the left in every right-side row and keep the continuity of

STRIPED SWEATER . . .

g.st. stripes in dk. wool on left side of dk. band only, and inc. 1 st. both ends of every 4th row until there are 130 st. on needle, ending with final inc. row.

There should now be 36 st. in lt. st.st. on one side of the 20 dk. g.st. and 74 st. in striped patt. on other side; work should measure about 11½in.

Keeping continuity of patt. work 5 more rows, thus ending with a row on wrong side.

To Shape Sleeves

Still working in patt., inc. 1 st. both ends of each of next 10 rows (150 st.).

Now, still moving dk. band as before and keeping the continuity of the stripes, work g.st. borders at sleeve edges and shape thus:—

1st row: K. 2, k. twice in next st., patt. to last 4 st., k. twice in next st., k. 3.

2nd row: K. 3, patt. to last 3 st., k. 3.

3rd to 6th rows: As 2nd row.

Rep. these 6 rows 5 times more, then first 4 rows once more.

There should be 164 st. on needle, with 80 st. in lt. on one side of the 20 dk. g.st. and 64 st. in striped patt. on the other side.

Work should measure about 17in. from cast on edge.

Next row: K. 81 lt., k. 20 dk., work to end.

Next row: Work to end of dk. band, k. 1 lt., p. lt. to last 3 st., k. 3 lt.

To Divide for Neck

Next row: K. 2, k. twice in next st., k. 74, k. 2 tog., k. 3, turn.

Now work on these st. with lt. wool for first side of neck thus:—

1st row: K. 3, p. to last 3 st., k. 3.

2nd row: K. to last 5 st., k. 2 tog., k. 3.

Rep. these 2 rows 5 times more, then 1st row once again.

To Shape Shoulder

Next row: Cast off 3, k. to last 5 st., k. 2 tog., k. 3.

Next row: K. 3, p. to end.

Rep. these 2 rows 9 times more (36 st.).

Next row: Cast off 11, k. to last 5 st., k. 2 tog., k. 3.

Next row: K. 3, p. to end.

Rep. last two rows once more.

Next row: Cast off 9 st., k. to end.

Now work in g.st. on rem. 3 st. for 4½in.

Cast off.

Return to rem. 82 st. and with right side of work facing, begin at neck edge, and keeping the continuity of the striped patt. and 3 st. in g.st. at sleeve edge, work thus:—

1st row: K. 3, k. 2 tog., k. 16 dk., work to last 4 st., k. twice into next st., k. 3.

2nd row: Work to last 20 st., k. 20 dk.

3rd row: K. 3, k. 2 tog., k. 16 dk., work to end.

4th row: Work to last 20 st., k. 20 dk.

Rep. last 2 rows 4 times more, then 1st row once again.

To Shape Shoulder

Next row: Cast off 3, work to last 20 st., k. 20 dk.

Next row: K. 3, k. 2 tog., k. 16 dk., work to end.

Rep. these 2 rows 9 times more (36 st.).

Next row: Cast off 11, work to last 20 st., k. 20 dk.

Next row: K. 3, k. 2 tog., work to end.

Rep. last 2 rows once more.

Cast off.

The Back

Using No. 10 needles and lt. wool, cast on 106 st. and work in g.st. for ½in. Now work 4 rows st.st., beg. with a p. row. Change to dk. wool and p. 2 rows. Change to lt. wool and work 8 rows in st.st. beg. with a p. row.

Rep. these last 10 rows once more.

Change to dk. wool and p. 2 rows.

Now work thus:—

1st row: P. 1 dk., p. lt. to end.

2nd row: K. lt. to last st., p. 1 dk.

3rd row: P. 2 dk., p. lt. to end.

4th row: K. lt. to last 2 st., p. 2 dk.

5th row: P. 3 dk., p. lt. to end.

6th row: K. lt. to last 3 st., p. 3 dk.

7th row: P. 4 dk., p. lt. to end.

8th row: K. lt. to last 4 st., p. 4 dk.

9th row: P. dk. to end.

10th row: As 9th row.

11th row: P. 6 dk., p. lt. to end.

12th row: K. lt. to last 6 st., p. 6 dk.

13th row: P. 7 dk., p. lt. to end.

14th row: K. lt. to last 7 st., p. 7 dk.

Work should now measure about 4½in.

Change to No. 12 needles.

15th row: P. 8 dk., p. lt. to end.

16th row: K. lt. to last 8 st., p. 8 dk.

17th row: P. 9 dk., p. lt. to end.

18th row: K. lt. to last 9 st., p. 9 dk.

19th row: P. dk. to end.

20th row: As 19th row.

Cont. thus, working as for front but reading k. for p. and p. for k., so as to reverse the patt.

Cont. thus until sleeve shaping is completed, omitting the division for neck, and there are 166 st., working the 3 st. at each sleeve edge in g.st.

Now work 14 rows in patt. with 3 st. in g.st. at each end of row without further shaping.

To Shape Shoulders

Cast off 3 st. at beg. of next 20 rows (106 st.). Then cast off 11 st. at beg. of next 4 rows. Cast off 9 st. at beg. of next 2 rows.

Cast off.

To Make up

Press and join side and shoulder seams, omitting small g.st. band.

Sew light strip from left-hand side of neck round back of neck and join to extra piece of dark band at right shoulder.

Press seams.

◆◆

Beef Stroganoff for 20 People

BEEF stroganoff, served with noodles, rice, or creamed potatoes, makes a delicious Sunday night tea for a crowd. Also it could be the main course of a buffet meal, when it could be prepared ahead and heated and the sour cream stirred in just before serving.

7 to 8 lb of topside or rump steak (¼ in. thick)
2 cloves of garlic
½ cup of flour
1 tablespoon of salt
1 teaspoon of pepper
4 large onions
1 tin of cream of chicken soup
1 to 3 lb of mushrooms (fresh or tinned)
1 tablespoon of sugar
½ pint of fresh cream
2 tablespoons of lemon juice

(The recipe can be halved)

Rub the steak on both sides with a cut clove of garlic. Pound into it a mixture of the flour, salt, and pepper. Cut the meat, against the grain, into thin strips about 2 in. long.

Peel and slice the onions. Brown the onion in a large saucepan with a lid in some of the trimmings of the beef fat. Remove the onion with a slotted spoon. Then brown the meat quickly in the same fat. (More fat may have to be added.) Remove the trimmings. Return the onion to the pan with the meat. Put the lid on and let it simmer over very low heat until the meat is quite tender.

Peel and cut the mushrooms in halves and add them and the chicken soup and sugar to the meat. Cover and let simmer until the mushrooms are tender.

Sour the fresh cream by adding the lemon juice to it and setting it aside in a warm place for a little while.

Remove the saucepan from the heat and when the meat stops bubbling stir in the sour cream. Serve immediately. (The sour cream will curdle if it is too cold or if the meat is too hot.)

Cooking time is about 1½ hours.

—*JANET W. ROBERTS,*
Home Science Instructor,
Department of Agriculture,
Auckland

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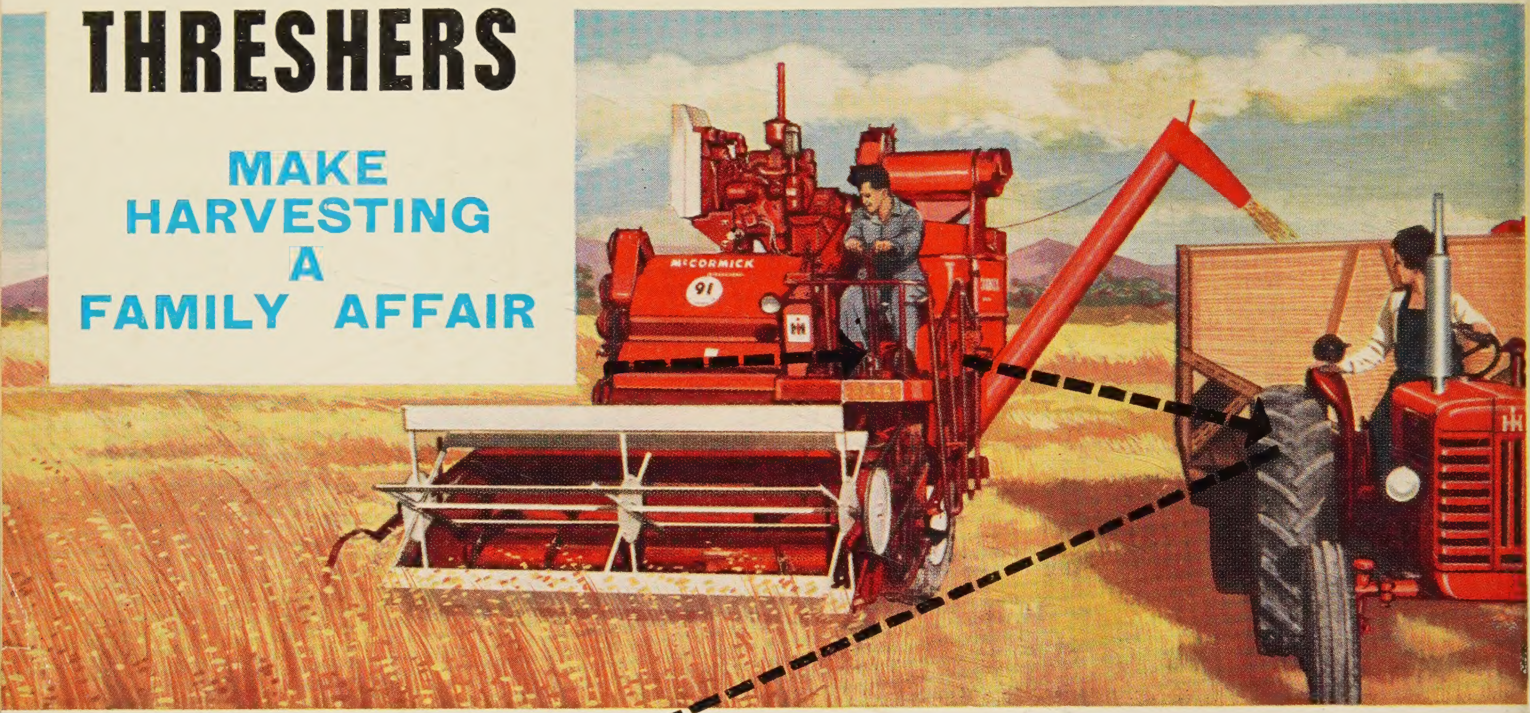

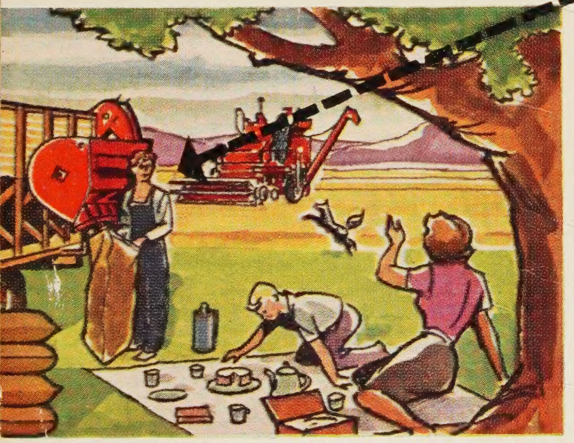

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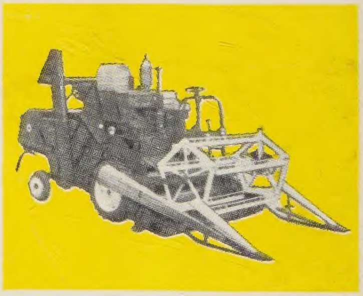

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